

C/007/022 Incoming

#4050

R

SAVAGE

Savage Services Corporation
Coal & Power Services Group
2025 East 5000 South
Box 1001
Price, UT 84501

(435) 637-5664
Fax (435) 637-3418

Mr. Steve Christensen
Permit Supervisor
Utah Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Attn: April Abate

Re: Midterm Review Response
Savage Service Corporation
Savage Coal Terminal
C/007/0022 , Task #3953

Dear Mr. Christensen:

Enclosed are 4 copies of the response for the midterm review of the Savage Coal Terminal MRP. Also included is a checklist indicating the response for each deficiency and required C1/C2 Forms.

It should be noted that the deficiency under R645-301-728 & -765 (AAA) will be addressed under a separate amendment. Savage Services will install a new ground monitoring well to replace the dry well S-1-GW, as requested. The amendment will be submitted by 3/31/12, with plans to install the new well within 30 days of Division approval.

If you have any questions, or need additional information, please let me know.

Sincerely,



Garth Nielsen
General Manager

Cc: Dan Guy
File

Creative Solutions for Materials Man

File in:

☐ Confidential

☐ Shelf

☒ Expandable

Date Folder 03/15/12 C/ 0070022

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MAR 15 2012

DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: Savage Services Corporation

Mine: Savage Coal Terminal

Title: Response to Midterm Review

Permit Number:

C/007/0022

Description, Include reason for application and timing required to implement:

Instructions: If you answer yes to any of the first eight questions, this application may require Public Notice publication.

- | | |
|---|---|
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ <input type="checkbox"/> increase <input type="checkbox"/> decrease. |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 2. Is the application submitted as a result of a Division Order? DO# _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 4. Does the application include operations in hydrologic basins other than as currently approved? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 6. Does the application require or include public notice publication? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 7. Does the application require or include ownership, control, right-of-entry, or compliance information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 9. Is the application submitted as a result of a Violation? NOV # _____ |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 10. Is the application submitted as a result of other laws or regulations or policies? |

Explain: Midterm Review

- | | |
|---|--|
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 11. Does the application affect the surface landowner or change the post mining land use? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2) |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 13. Does the application require or include collection and reporting of any baseline information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 15. Does the application require or include soil removal, storage or placement? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 19. Does the application require or include certified designs, maps or calculation? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 20. Does the application require or include subsidence control or monitoring? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 21. Have reclamation costs for bonding been provided? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 23. Does the application affect permits issued by other agencies or permits issued to other entities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 24. Does the application include confidential information and is it clearly marked and separated in the plan? |

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Garth Nielsen

General Manager

03/15/2012

[Signature]
Signature (Right-click above choose certify then have notary sign below)

Print Name

Position

Date

Subscribed and sworn to before me this 14 day of March, 2012

Notary Public: [Signature], state of Utah.

My commission Expires: 07-02-2014

Commission Number: 583388

Address: 1323 So. 1000 W.

City: Price

State: UT

Zip: 84501



TAMI L. MCKENDRICK
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 583388
COMM. EXP. 07-02-2014

For Office Use Only:

Assigned Tracking Number:

Received by Oil, Gas & Mining

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MAR 15 2012

DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Savage Services Corporation

Mine: **Savage Coal Terminal**

Permit Number:

C/007/0022

Title: Response to Midterm Review

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED[illegible]

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

Received by Oil, Gas & Mining

Checklist for Deficiencies

Midterm Permit Review

Savage Coal Terminal

R645-301-100 (AN): Officer and Director changes are included in resubmitted Chapter 1.

R645-301-100 (AAA): N/A – No changes in ownership or control.

R645-301-121.100 (PB): Updated Appendix 5-1 and Figure 1.

R645-301-341 (JCH): Site visit to be arranged.

R645-301-728 & -765 (AAA): Commitment to install a replacement well for S-1-GW is included in cover letter. Details to be included in a future amendment.

R645-301-728 (AAA): The PHC is updated in Appendix 7-3.

R645-301-724.100 (AAA): Chapter 7 has been reformatted and is being submitted with this response. This includes revised Tables 7-4 and 7-4a for the French Drain, and new Tables 7-4b and 7-4c for S-2-GW.

R645-301-800 (PHH): Updated bond cost data is included in Appendix 8-1.

**Savage Services Corporation
Savage Coal Terminal
C/007/022**

Chapter 1

General Contents

R645-301-100

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DIV. OF OIL, GAS & MINING

- R645. Natural Resources; Oil, Gas and Mining; Coal.
- R645-301. Coal Mine Permitting: Permit Application Requirements.
- R645-301-100. General Contents.**
112. Identification of Interests.
- 112.100. The applicant is a Utah Corporation.
- 112.210. The permit applicant name, address, telephone number and employer I. D. Number is:
- Savage Services Corporation
6340 South 3000 East, Suite 600
Salt Lake City, Utah 84121
(801) 944-6600
Employer I.D. #87-0237425
- 112.220. The applicant's resident agent is:
- Terrence Savage
6340 South 3000 East, Suite 600
Salt Lake City, Utah 84121
(801) 944-6600
- 112.230. The abandoned mine land reclamation fee will be paid by Savage Services Corporation.
- Savage Services Corporation
6340 South 3000 East, Suite 600
Salt Lake City, Utah 84121
(801) 944-6600
Employer I.D. #87-0237425
- 112.300. All stock is owned by:
- Savage Companies
6340 South 3000 East, Suite 600
Salt Lake City, Utah 84121
(A Utah Corporation)
Employer I.D. #87-0387049

112.310. Officers and Directors of the Applicant.

The names and addresses of every officer, partner, director, or other person performing a function similar to a director of the applicant:

SAVAGE SERVICES CORPORATION

Corporation: Savage Services Corporation
Type of Entity: Utah Corporation
Date of Formation: June 22, 1959

Shareholder: Savage Companies

Officers and Directors for Savage Services Corporation:

Directors:		Date:
Allen B. Alexander	Chairman	05/15/78
Neal Savage	Vice Chairman	06/22/59
John K. Savage	Director	01/01/70
Kirk W. Aubry	Director	06/06/11
Curtis C. Dowd	Director	06/06/11

Officers:		Date:
Allen B. Alexander	President and CEO	05/15/78
Todd L. Savage	Exec. VP	09/23/76
Kelly J. Flint	Sr. VP, Secretary, Gen. Counsel	01/01/03; 06/01/08
Curtis C. Dowd	Exec. Vice President, CFO	08/30/04
Gary L. Plant	Sr. Vice President	02/20/04
C. Fred Busch	Sr. Vice President	01/16/85
Howard F. Goodman	Sr. Vice President	05/01/84
John K. Savage	Sr. Vice President	01/01/70
Donald W. Alexander	Sr. Vice President	02/01/83
Kim F. Christensen	Sr. Vice President	04/30/86
Charles O. Monroe	Sr. Vice President	06/23/94
Kenneth W. Cooper	Sr. Vice President	10/28/85
Kenneth D. Ellzey	Sr. Vice President	09/01/88
Eric B. Adamson	Sr. Vice President	05/10/76
Nathan N. Savage	Sr. Vice President	06/02/86
Jeff M. Chesler	Sr. Vice President	01/02/91
Terrence Savage	Sr. Vice President	06/02/80
M. Troy Savage	Sr. Vice President	06/05/85
Jack M. Cohn	Sr. Vice President	07/17/89
Ellis Edwards	Sr. Vice President	11/24/75

Kirk W. Aubry	Exec. Vice President, COO	10/15/10
Erik Skoy	Vice President	06/22/09
Byron Lawrence	Vice President	06/06/11
Dan Price	Vice President	06/06/11
Ed Ivey	Vice President	06/06/11
Beau Harris	Vice President	06/06/11
Robert Drake	Vice President	12/03/09
Mike McBride	Vice President	06/06/11
Steve Stewart	Vice President	09/12/11
Chris Thomas	Vice President	09/12/11
Jim Mochetti	Sr. Vice President	01/01/09
Raymond Alt	Sr. Vice President	07/31/73
Boyd E. Draper	Sr. Vice President	01/18/82
Troy Reid	Vice President	06/15/91
Mark Wehmanen	Vice President	01/15/96
Tad A. Kock	Vice President	09/16/86
David L. Harris	Vice President	08/04/99
Jose L. Fernandez	Vice President	09/19/94
Jerry Evenson	Vice President	01/16/98
C. Scott Smith	Vice President	08/01/97
Debbie Rhodes	Vice President	09/08/83
Brad Crist	Vice President	03/11/02
Gerald Farrell	Vice President	10/01/06
Rob Davidson	Vice President	06/07/88
Sharon Broadwater	Vice President	10/30/06
Jason Ray	Sr. Vice President	05/01/05
Mike Miller	Vice President	08/20/01
Kent Avery	Vice President	04/23/08
Amy Poulson	Assistant Secretary	12/01/07
Benjamin Bates	Assistant Secretary	01/03/12

SAVAGE COMPANIES

Type of Entity: Utah Corporation
Date of Formation: October 2, 1970

Shareholders:

Class A (voting):

LaRae T. Savage Q-Tip Marital Trust	
Neal Savage	06/01/57
Susan A. Savage Q-Tip Marital Trust	06/01/57

Class C (voting):

Allen B. Alexander	33.3%	05/15/78
H. Benson Lewis	33.3%	08/01/85

Officers and Directors for Savage Companies:

Directors:		Date:
Allen B. Alexander	Chairman	05/15/78
Neal Savage	Vice Chairman	06/22/59
H. Benson Lewis	Vice Chairman	08/01/85
James T. Jensen	Director	07/01/90
Kirk W. Aubry	Director	06/06/11
Curtis C. Dowd	Director	06/08/10
Kelly J. Flint	Director	06/08/10
David G. Wolach	Director	04/29/87
Todd L. Savage	Director	09/23/76
John K. Savage	Director	01/01/70
Howard F. Goodman	Director	05/01/84
Donald W. Alexander	Director	02/01/83
Nathan N. Savage	Director	06/02/86

Officers:		Date:
Allen B. Alexander	President and CEO	05/15/78
Kirt W. Aubry	Exec. Vice President, COO	10/15/10
Todd L. Savage	Exec. Vice President	09/23/76
Curtis C. Dowd	Sr. Vice President, CFO	08/30/04
Donald W. Alexander	Sr. Vice President	02/01/83
John K. Savage	Sr. Vice President	01/01/70
Kelly J. Flint	Sr. VP, Secretary	01/01/03
Howard F. Goodman	Sr. Vice President	05/01/94
Nathan N. Savage	Sr. Vice President	06/02/86
Jason Ray	Sr. Vice President	03/18/11
David L. Harris	Vice President and Controller	08/04/99
Tad A. Koch	Vice President	09/16/86
C. Scott Smith	Vice President	08/01/97
Sharon Broadwater	Vice President	10/30/06
Chris Thomas	Vice President	12/12/11
Amy Poulson	Assistant Secretary	12/01/07
Benjamin Bates	Assistant Secretary	01/03/12

Previous officers and end dates:

Isaac Haboucha	05/08/08
Butch Jentzsch	12/31/07
Kevin R. Haugh	02/01/08
Mark Andrew Nelson	02/15/06

112.320. All stock is owned by The Savage Companies (see Section 112.300).

112.330. See Section 112.310.

112.340. N/A - None.

112.350. N/A - There are no other coal mine operation permits in the name of Savage Services Corporation.

112.400. (See Section 112.340)

112.500. The owner of the surface and coal is:

Savage Services Corporation
6340 South 3000 East, Suite 600
Salt Lake City, Utah 84121

112.600. See Plate 1-1 for owners of record, and Table 1-1 for details and addresses.

112.700. The MSHA numbers for all mine-associated structures are:

Mine Name: Savage Coal Terminal.

MSHA I.D. # 42-01444

(See also Appendix 1-2 for MSHA Refuse Pile Numbers).

Please note the appendix 1-2 shows 2 refuse permits. The temporary permit was terminated on 3/19/81. The permanent permit was reassigned a new MSHA ID# on 08/10/00.

112.800. N/A - None.

112.900. When notified the application is approved, but before the permit is issued, the applicant shall, as applicable, update, correct or indicate that no change has occurred in the information previously submitted under R645-301-112.100 through R645-301-112.800.

113. Violation Information

- 113.110. The applicant has not had a federal or state permit to conduct coal mining and reclamation operations suspended or revoked in the last 5 years.
- 113.120. The applicant has not forfeited a performance bond or similar security deposited in lieu of bond.
- 113.200. N/A
- 113.300. A list of all notices of violation received by the applicant in the past 3 years for violations pertaining to air or water environmental protection is included in Appendix 1-1.
- 113.310. See Appendix 1-1.
- 113.320. See Appendix 1-1.
- 113.330. See Appendix 1-1.
- 113.340. See Appendix 1-1.
- 113.350. See Appendix 1-1.
- 113.400. After the applicant is notified that the application is approved, but before the permit is issued, the applicant shall, as applicable, update, correct or indicate that no change has occurred in the information previously submitted under R645-301-113.

114. Right of Entry Information.

General:

Utah Power & Light originally leased the site for coal loading operations because of its proximity to the Denver and Rio Grande Western (D&RGW) railroad siding. Swisher Coal Company purchased the SW ½ of Section 11 for the purpose of developing a preparation and loadout facility for unit coal trains. Original UP&L disturbance occurred in 1975. Expansion activities by Swisher Coal Company were conducted between October 1977 and April 1978. The site was purchased by ARCO Coal (Atlantic Richfield Co.) in 1980. The local company name was changed from Swisher Coal Company to Beaver Creek Coal Company. The Utah and Colorado coal operations (including Beaver Creek Coal Co.) were placed under a subsidiary company of ARCO Coal, known as Mountain Coal Co. The coal terminal was sold to Savage Industries, Inc. (now Savage Services Corporation) in 1995, by the parent company of Beaver Creek Coal - Mountain Coal Company. The facility name formerly Castle Valley Spur or C.V. Spur was then changed to Savage Coal Terminal, in 1999.

- 114.100. A description of the documents upon which the applicant bases its legal right to enter and begin underground coal activities in the permit area and whether the rights are the subject of pending litigation.

Documents Establishing Legal Right to Enter

It should be noted that wherever right-of-entry documents name Swisher Coal Company or Beaver Creek Coal Company, these documents have been transferred and filed with the County Recorder in the name of Savage Services Corporation.

Plate 1-1 shows the boundaries of lands within the proposed permit area upon which the applicant has the legal right to enter and conduct coal operations. The documents which give applicant the legal right to enter, commence and maintain coal preparation and load-out activities in the permit area are as follows:

1. Special Warranty Deed dated November 11, 1977 from Utah Power & Light Company, grantor, to Swisher Coal Company (later Beaver Creek Coal Company), grantee, covering all the surface and part of the minerals of the following described lands:

Township 15 South, Range 10 East, SLBM

Section 11: SW 1/4, expecting therefrom the most Easterly 100 feet thereof.

2. Lease, granted for the purposes of railroad trackage and coal loading facilities, dated January 15, 1981, from The Denver and Rio Grande Western Railroad Company, lessor, to Beaver Creek Coal Company, lessee, covering the surface of the following described lands:

Township 15 South, Range 10 East, SLBM

A rectangle tract of lessor's land near Price, Utah, being the Westerly 42.5 feet of lessor's right-of-way from Engr. Sta. 91 plus 70 to Engr. Sta. 132 plus 70 of lessor's Castle Valley Spur.

3. Trackage agreement, dated January 22, 1974, between The Denver and Rio Grande Western Railroad and Utah Power & Light Company providing for construction and operation of trackage between Station 90 + 20 and Station 134 + 20 off the main track of Castle Valley Spur. With the consent of The Denver and Rio Grande Western Railroad Company, said agreement was assigned to Swisher Coal Company (later Beaver Creek Coal Company) on February 27, 1978.
4. Letter agreement, dated January 17, 1978, between R. D. & Peggy Campbell and Swisher Coal Co. (later Beaver Creek Coal Company) wherein Campbells grant a 20-foot right-of-way for water pipelines over and across their land in Sections 2 and 11, Township 15 South, Range 10 East, between the Price River and Beaver Creek Coal Company's coal preparation and loadout facilities in the SW ¼ of Section 11, Township 15 South, Range 10 East.

5. Right-Of-Way Agreement, dated January 1, 1978, between David and Mildred Cave and Judson D. and Cherie Critchlow, grantors, and Swisher Coal Co. (later Beaver Creek Coal Company), grantee wherein Cave and Critchlow grant a 20-foot right-of-way for water pipelines over and across their property in Section 2, Township 15 South, Range 10 East, together with the right to build a pumphouse thereon.
6. Approved Change of Diversion Application No. 1308, covering 357 acre-feet of water for industrial use in the coal preparation plant.
7. Lease Agreement with Option to Purchase between Mountain Coal Company and Savage Industries, Inc. September 9, 1994. Site purchased December 9, 1997 by Savage Industries, Inc. (See Appendix 1-5).
8. Name change from Savage Industries, Inc. to Savage Service Corporation, June 22, 2003, filed with the Department of Commerce.

Pending Litigation:

None.

Surface Mining Rights:

The surface operations associated with coal processing and loadout activities do not involve the surface mining of coal. No private coal mineral estate is to be severed from the property during the term of this permit.

- 114.200. N/A - This is a coal processing and loadout facility. There are no plans for mining of coal.
- 114.300. Nothing given under R645-301-114.100 through R645-301-114.200 will be construed to provide the Division with the authority to adjudicate property rights disputes.

115. Status of Unsuitability Claims.

115.100. Areas Designated Unsuitable for Mining

The proposed permit area is not within an area designated unsuitable for the surface effects of underground coal mine activities under the R645 regulations. Neither is the proposed permit area under study for designation in an administrative proceeding initiated under renewable resource lands and would not result in substantial losses of food fiber, or water supply. The permit area contains no prime farmland or merchandisable timber. Mining would not affect natural hazard lands and thereby endanger life and property. It contains no cemeteries, no national trails, no wild and scenic rivers, no wilderness or wilderness study areas, and no sufficient harvestable forest cover.

115.200. Exemption

The applicant does not claim exemption.

115.300. Dwellings

There are no occupied dwellings within ¼ mile of the proposed permit area.

The operations are within 100' of a public road which provides access to the site.

This has been approved under the existing permit.

116. Permit Term

116.100. Surface Acres Affected

The number of surface acres to be disturbed by the operation is 153.46 acres. There are no plans for additional surface disturbance for this operation at this time.

The permit area is described as follows:

Township 15 South, Range 10 East, Salt Lake Base & Meridian.

Section 11: W1/2 SW1/4 except 0.24 ac. in the NW corner and 5.42 ac. in the SW corner;
E1/2 SW1/4 except East 100'.

Also included in the permit area is a 20' Right-of-Way for a pipeline across the SE $\frac{1}{4}$ NW $\frac{1}{4}$ and NW $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 11 (1.21 acres), and across the SW $\frac{1}{4}$ SW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$, SW $\frac{1}{4}$ NW $\frac{1}{4}$ and NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 2 (3.97 acres). This area is located on the "Price Quadrangle", U.S. Geological Survey 7.5 minute map.

Horizontal Extent of Underground Workings - N/A

All 153.46 acres of the permit area may be affected by surface activities.

Vertical Extent of Workings - N/A

This permit will be for a period of 5 years. The permit is expected to be renewed at 5-year intervals throughout the life of the property.

116.200. N/A - The initial permit term is not requested for more than 5 years.

117. Insurance, Proof of Publication and Facilities or Structures Used in Common.

117.100. A Certificate of Liability Insurance is included in Chapter 8, Appendix 8-3.

117.200. A copy of the newspaper advertisement for renewal of this permit is included in Appendix 1-3.

117.300. N/A

118. Filing Fee.

A filing fee of \$5.00 has been submitted to the Division with this application.

120. Permit Application Format and Contents.

121. The Permit Application:

121.100. The permit application contains current information.

121.200. The permit application is intended to be clear and concise.

121.300. This application is filed in the format required by the Division.

122. All reference materials used in this application have been provided in the permit, or are readily available to the division.

123. A notarized statement is included in Appendix 1-5.

130. Reporting of Technical Data

131. All technical data submitted in the permit application is accompanied by the names of persons or organizations that collected and analyzed the data, dates of collection and analysis of the data, and descriptions of the methodology used to collect and analyze the data.

132. Technical analyses will be planned by or under the direction of a professional qualified in the subject to be analyzed.

140. Maps and Plans

141. Maps have been submitted in a consolidated format and per regulation.

142. Maps are included to show both operation and reclamation phases. In addition, Plate 5-1 shows areas of the site disturbed prior to August 3, 1977, after August 3, 1977 and prior to May 3, 1978, after May 3, 1978 and prior to approval of the State Program and after issuance of the Permit. 142.100 Prior to August 3, 1977;

142.200. See Plate 5-1.

142.210. See Plate 5-1.

142.220. N/A - There have been no small operator's exemptions.

142.300. See Plate 5-1.

142.400. See Plate 5-1.

150. Completeness

This is a reformatted permit application submitted for renewal of an existing approved permit. This application is intended to address each of the R645-301 regulations for completeness and technical adequacy.

**TABLE 1-1
RECORD HOLDERS OF LEGAL INTERESTS
SURFACE OWNERSHIP**

Surface Owner:	Address:
Savage Services Corporation	6340 South 3000 East, Suite 600 Salt Lake City, Utah 84121
Agnes K. Pierce	735 North 700 East Price, Utah 84501
UPC Inc.	53 West Angelo Avenue Salt Lake City, Utah 84115
John Brown	53 West Angelo Avenue Salt Lake City, Utah 84115
Circle K Ranch	P.O. Box 700 Price, Utah 84501
John L. & Christy L. Hanna	1830 East 5000 South Price, Utah 84501
Kevin Ray & Lois W. Jensen	P.O. Box 219 Cleveland, Utah 84518
David C. Swenson	2269 N. Hillcrest Drive Wellington, Utah 84542
High Country Forest Products	8243 Old Federal Road Montgomery, AL 36117
David R. Cave	1220 South 530 West Price, Utah 84501
Roy D. & Peggy L. Campbell	P.O. Box 269 Wellington, Ut 84542
Alan Walton	3212 South State Street Salt Lake City, Utah 84115
E. W. Stoddard	P.O. Box 65644 Salt Lake City, Utah 84165
E. W. Stoddard	53 West Angelo Ave Salt Lake City, Utah 84115
Denver & Rio Grande Western Union Pacific Railroad Company	1400 Douglas - Stop 1640 Omaha, NE 68179
2 C's Properties, LLC.	1865 West Ridge Road Wellington, Utah 84542

**TABLE 1-1
RECORD HOLDERS OF LEGAL INTERESTS
MINERAL OWNERSHIP**

Mineral Owner:	Address:
John C. & Sophia Critchlow	Rout 1, Box 331 Price, Utah 84501
Olga Downard	223 South 5 th East Price, Utah 84501
Ervin & Violet Feichko	Route 1 Helper, Utah 84526
Geraldine Thomas & Eldred E. Pierce, Jr.	6715 Lederer Street Canoga Park, California 91300
Kent E. & Clara W. Peterson	Unknown Salt Lake City, Utah 84101
Price City	City Hall, 185 East Main Street Price, Utah 84501
G.W. Waterman	Route 1 Box 113 Price, Utah 84501
State of Utah Division of State Lands	675 East 500 South, Suite 500 Salt Lake City, Utah 84102
Jack & Frank World	760 North 5 th East Price, Utah 84501
Mountain Coal Company	P.O. Box 591 Somerset, Colorado 81434
Denver & Rio Grande Western Union Pacific Railroad Company	1400 Douglas - Stop 1640 Omaha, NE 68179
USA	203 State Capital Building Salt Lake City, Utah 84114
KDS Commercial Property, LLC. Kent Shiner	P.O. Box 973 Price, Utah 84501

See Plate 1-1 for Surface & Mineral Ownership Map.

Appendix 5-1

Proposed Removal of Main Refuse Pile

**Savage Services Corporation
Savage Coal Terminal**

RECEIVED
MAR 15 2012
DIV. OF OIL, GAS & MINING

Proposed Removal of Main Refuse Pile

I. Introduction

Savage Industries, Inc. has entered into an agreement with the Sunnyside Cogeneration Associates (SCA) to burn the refuse from the Savage Coal Terminal in their waste-coal fired production facility location in Sunnyside, Utah. This amendment is being submitted to provide details required for Division approval to remove and burn the coal waste material contained in the main refuse pile located at the Savage Coal Terminal.

II. General

The basic plan was to begin removal of the refuse material in August of this year. At that time, approximately 5000 tons of material will be placed in the permitted lay-down area at the Sunnyside Facility, to provide for a small back-up or surge area as needed. After that it was planned to haul approximately 450 to 600 tons/day of the refuse material directly to the power plant feed. This was intended to continue 7 days/week until the pile is removed and burned.

Although the removal started as planned, it was put on hold due to circumstances at the power plant, and only sporadically continued until recently. The pile is now being shipped on a regular basis, and it is scheduled to continue until it is completely removed.

All environmental controls (i.e. - drainage, etc.) will be maintained throughout the removal process. There are no plans to reclaim the removal area in the near future, since this area will likely be used as a coal stockpile area for the life of the facility; however, it will be reclaimed per the plan when it is no longer required for the operation. A submittal has been made to OSM requesting a determination of the applicability of reclamation fees for this pile, along with information to support the request for a no value/fee determination. A ground control plan has also been submitted to MSHA for their approval of the removal of this pile. A sample location map and analyses are included as Figure 2 and Attachment 1, respectively.

III. Timing

As mentioned above, refuse removal has been somewhat sporadic until recently. The refuse is now being shipped on a regular basis, and a schedule has been laid out to finish the process. Based on a survey from 7/13/11, and on-site measurements, it is estimated that the pile contains approximately 400,000 tons of material. The present schedule is to remove approximately 195,000 tons in 2012, 189,000 tons in 2013 and to finish removing any remaining tonnage in 2014. The map of the latest survey of the pile is shown on Figure 1. It should be noted that the actual location of removal may vary depending on quality requirements; however, the general plan is to work from southwest to northeast, with the vast majority of the pile removed over the next 2 years.

IV. Environmental Controls

The proposed method and direction of extraction allow for existing environmental controls (berms, ditches, culverts) to remain in place for approximately one year before they have to be simply relocated on the pile.

A. Hydrology

The main environmental controls for this pile consist of hydrologic protection in the form of ditches, berms and culverts. During the removal process, the existing ditches CD-13 and CD-7 will remain in place and continue to be maintained to the size required for runoff from a 100 year-6 hour event. The erosion protection berm on the top of the pile and the flex pipe (Culvert C-22) will remain in place as long as they can be properly operated. Once extraction approaches the berm and culvert, they will be relocated as shown on Figure 1. This will continue until the pile is eliminated. The operation and maintenance of existing hydrologic controls will therefore remain the same throughout the removal process, although specific drainage areas will be less and locations will vary with the reduction of the pile.

It should also be noted that all runoff will continue to go to Sediment Pond No. 5 as per the plan.

B. Vegetation

None of the refuse area has been resoiled or revegetated, with the exception of the small test plot on the southwest corner. This test plot was in place for more than 10 years, and was regularly monitored and later removed with Division approval. A further evaluation of this test plot will be made in 2000, and a proposal will be made after that time as to whether the test plot should be removed or relocated. This will be covered by a separate amendment.

C. Soils

No new removal of soils will be needed for this amendment. Existing soils stockpiles were taken from this area; however, since the refuse area will be used as a coal stockpile area, no soil replacement is planned until final reclamation.

D. Air Quality

The refuse pile is included in the present Air Quality Permit as a stockpile area. Since the site will remain as a stockpile area, no changes are needed to the plan. The actual impact on the removal will likely be positive, since the area covered by the refuse is likely larger than that which will be covered by a coal stockpile at any given time.

E. Reclamation

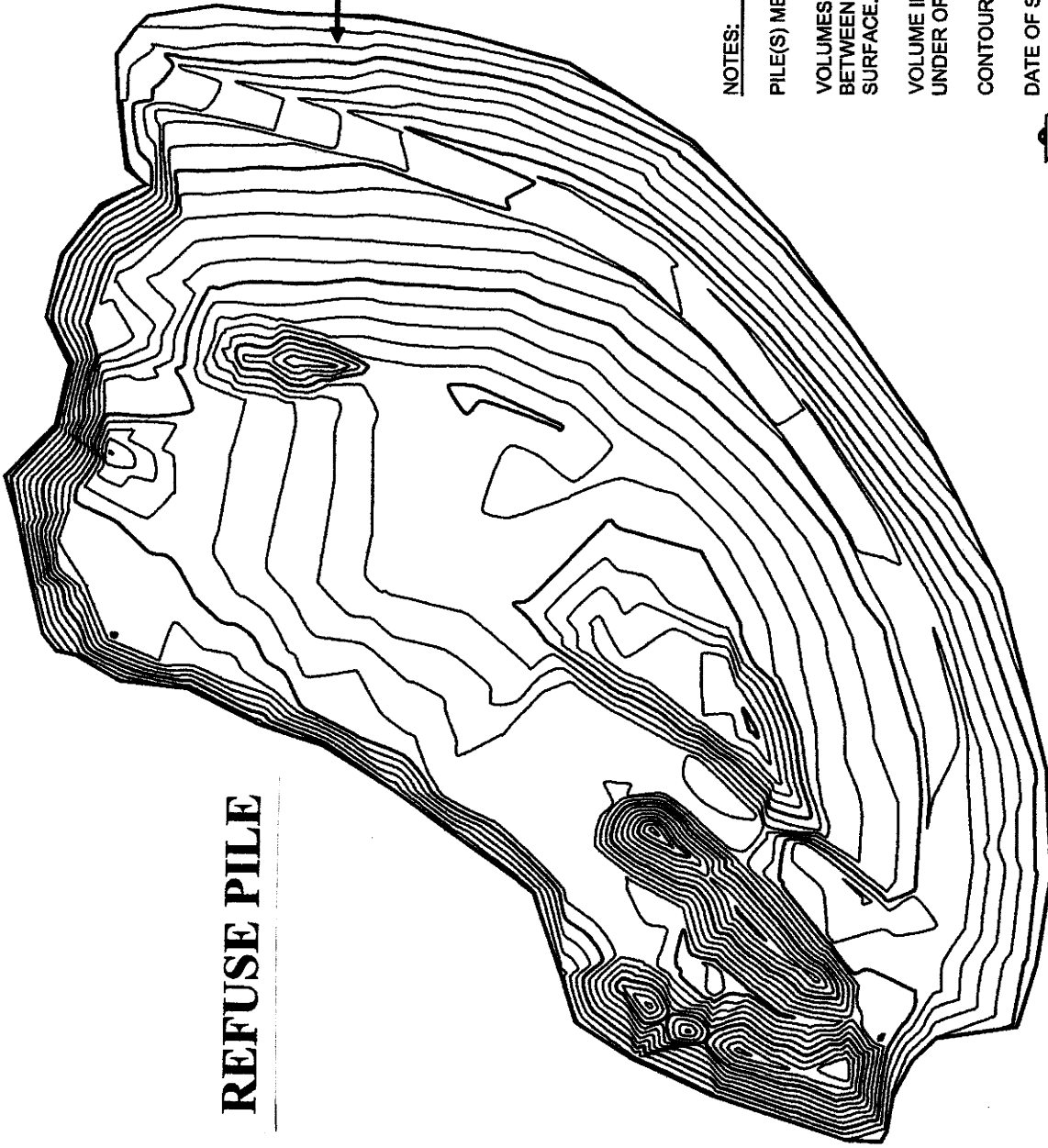
Since this is a disturbed area, it is planned to continue to use the site for needed coal storage area after the refuse is removed. Once the area is no longer required for the operation, it will be reclaimed according to the approved reclamation plan. The depth of soil replacement, treatment and seeding will be the same as that approved for the refuse area.

Attachment 1

Refuse Pile Analyses

SAVAGE

REFUSE PILE



SURVEYED VOLUME:
4,149,000 CUBIC FEET

NOTES:

PILE(S) MEASURED WITH SURVEY GRADE G.P.S.

VOLUMES CALCULATED USING COMPOSITE METHOD
BETWEEN TIN SURFACES FOR THE BASE AND PILE
SURFACE.

VOLUME INCLUDES ALL STRUCTURES LOCATED
UNDER OR WITHIN THE BOUNDARIES OF THE PILE.

CONTOURS SHOWN ARE 2'.

DATE OF SURVEY: 07-13-11

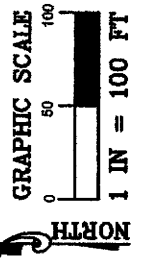
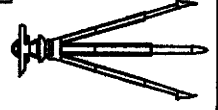


FIGURE 1

WARE SURVEYING, L.L.C.

Phone: 435-820-4335

Email: waresurveying@emerytelcom.net

**Savage Services Corporation
Savage Coal Terminal
C/007/022**

Chapter 7

Hydrology

R645-301-700

RECEIVED
MAR 15 2012
DIV. OF OIL, GAS & MINING

R645. Natural Resources; Oil, Gas and Mining; Coal.

R645-301. Coal Mine Permitting: Permit Application Requirements.

R645-301-700. Hydrology.

710. Introduction.

711. General Requirements. Each permit application will include descriptions of:

711.100. Existing Hydrologic Resources. (See Section 720.)

711.200. Proposed Operations. (See Section 730.)

711.300. Methods and Calculations. (See Section 740.)

711.400. Performance Standards. (See Section 750.)

711.500. Reclamation. (See Section 760.)

712. All required cross-sections, maps and plans have been prepared under the direction of, and certified by, a qualified, registered professional engineer of the State of Utah.

713. Inspection. Impoundments will be inspected as described under R645-301-514.300.

720. Environmental Description.

721. See Sections 724.100 and 724.200 for descriptions of the groundwater and surface water, respectively.

722. Cross Sections and Maps.

722.100. Location of Subsurface Water. (See Plates 7-1 and 7-2.)

722.200. Location of Surface Water. (See Plates 7-1 and 7-2.)

722.300. Monitoring Stations. (See Plate 7-1.)

722.400. Water Wells. (See Plates 7-1 and 7-2.)

722.500. Topography. (See Plate 7-1.)

723. Water Quality.

All water quality analyses are conducted in accordance with requirements of R645-301-723.

724. Baseline Information.

The application will include the following baseline hydrologic, geologic and climatologic information, and any additional information required by the Division.

724.100. Groundwater Hydrology

Methodology - A groundwater investigation was developed to:

1. Review all published data and geologic information concerning potential aquifers and groundwater resources in the vicinity of the Savage Coal Terminal site.
2. Identify and locate any discharge areas and uses of groundwater using photo field reconnaissance.
3. Install monitoring wells to locate the water table or perched groundwater levels in the area and to determine aquifer characteristics.
4. Monitor water quality characteristics of the aquifer in order to establish a baseline with seasonal variation.
5. Determine rate and direction of groundwater movement.

Existing Groundwater Resources

The Savage Coal Terminal is near the middle of Castle Valley, a broad featureless plain between the Wasatch Plateau to the west and the San Rafael Swell to the east. A detailed geologic discussion is developed in Chapter 6. Briefly, the Savage Coal Terminal facility is located on the middle Bluegate shale member of the Mancos Formation and is approximately 500 feet above the Ferron sandstone member of the Mancos Formation. The Blue gate member consists of dark blue-gray marine mudstone and acts as an aquitard. The upper 10 to 20 feet consists of weathered clays, occasional lenses and pods of gravelly residuum, and residual type silty clay loam soils characteristic of the weathered Mancos shale.

Regional Groundwater Hydrology

Published groundwater data for the area surrounding the Savage Coal Terminal site is limited. However, the U.S. Geologic Survey (1979) has compiled the published selected groundwater data in the Wasatch Plateau and Book Cliffs area. Also, drilling logs for oil and gas wells drilled in the area were obtained from the Utah Division of Oil, Gas and Mining. This data is sufficient to give a good indication as to the existence and relative location of water bearing strata in the area.

Logs of oil and gas wells drilled in the area indicate that regional groundwater was first encountered in the Ferron Sandstone approximately 500 feet below the surface. Five of thirteen wells recovered brackish or salty water from this strata. The other 8 wells did not find water in this strata. Because of the variable and discontinuous nature of the sandstone and the poor quality of the water, the Ferron is not an important aquifer in this area.

A water table does exist in some locations above the impermeable Bluegate shale. In the general area, this water table exists in the alluvium or weathered shale and gravelly pods above the Bluegate Shale.

Ground Water Levels

Note: The following discussion on the observation wells is included for informational purposes, although all of the wells described have been decommissioned and removed at this time. 2 new wells were drilled in 2006; however, there is very limited data available on them at this time.

The measurements in the observation wells as recorded in Table 7-1 indicate that there is no regional ground water table at the site, although a perched water table exists at some locations on the site. The aerial extent of this perched water table could not be precisely determined from existing monitoring well network.

Wells No. CV0W, CV7W, and CV9W were dry indicating that no water table exists above the Bluegate Shale at these locations. Well CV2W was also dry throughout much of the baseline monitoring. Well CV0W was apparently influenced by the French Drain intercepting shallow groundwater flow from the north and west. Well CV9W may also be influenced by the other French

Drain. Wells CV7W and CV2W appear to have been near a bedrock ridge where groundwater seldom occurs. A water table existed near Wells CV3W, CV4W, CV6W and CV8W. The water level fluctuations in CV8W and CV6W had similar pattern with an initial rise of about one foot during August, 1980 and the generally increased during the monitoring period until November, 1981 when water levels decreased nearly one foot in CV8W and one half foot in CV6W. The direction of groundwater flow was from CV8W to CV6W although the magnitude of the potentiometric gradient varies from about 1.4 feet to 0.1 feet.

A swampy area exists on the east side of the railroad tracks in close proximity to Well CV6W (See Plate 7-1). The surface elevation of this area is approximately at the same elevation as the water level was at Well CV6W. Heavy accumulations of salt exist on the soil surface in this swampy area indicating substantial amounts of water have been lost to evaporation in the past. This location is considered to be a groundwater discharge area for water which is found beneath the Savage Coal Terminal site.

Well CV10W was located in an alfalfa field about 1,000 feet east of the swampy area. The water level in Well CV10W rose at first and then declined until it eventually went dry. A substantial water surface elevation drop existed between the swampy area near Well CV6W and Well CV10W. One would expect ground water to move towards Well CV10W from the swampy area; however, Well CV10W went dry during the monitoring period while the water level in the vicinity of Well CV6W did not change substantially. Thus, ground water does not appear to flow eastward toward observation Well No. 10. An explanation for this is that the ground water in the area of Wells CV8W and CV6W was ponded in a bedrock swale of the impermeable shale with the boggy area located along eastern edge of this swale.

Although observation Well CV9W was dry, a high water level in Well CV3W and the existence of a small swampy area between wells CV9W and CV3W suggested a perched water table west of Well CV9W. The source of this water is seepage from the canal along the southern perimeter of the property near the top of the ridge. This water probably moves downslope toward the center of the property and was a source of groundwater in the vicinity of observation wells CV6W and CV8W. In fact, water levels in CV6W and CV8W appeared to increase during the late summer when irrigation water has been flowing in the canal.

The water level in wells CV4W, CV5W, CV11W, CV12W and CV13W appeared to be influenced by the application of irrigation water to the farmland north of the site. The water level in Well CV4W was 4.5 to 6 feet below to water level indicating the influence of the french drain along the northern boundary of the Savage Coal Terminal property. It is believed that a groundwater mound exists below the irrigation fields and that irrigation return flows from the fields to the north is the dominant source of the water which discharges from the drain. The large fluctuations in observation Well CV5W on the north side of the drain indicated the influence of irrigation water applied to the adjacent field.

Table 7-1 presents the water table elevation at the various observation wells on August 1980 through December 1982. Wells which were dry show elevations for the bottom at those wells. A vertical difference of approximately one foot existed between the water levels in Wells CV6W and CV8W. If the value for hydraulic conductivity computed from the pump test is assumed to be representative, ground water will move 6 feet per year toward the east at this gradient. Ground water will move approximately 30 feet per year along the gradient toward observation well CV11W to the northeast. Consequently, a net movement of 21 feet per year to the northeast will occur.

A substantial gradient also existed between observation Well CV4W and CV11W. If no obstructions from impermeable shales exist between these two wells, groundwater movements may range from 8 to 50 feet per year depending upon the location and gradient. However, a continuous water table is not found at the site. Water is consistently found in bedrock lows but often absent along bedrock highs.

A typical ground water monitoring well design is shown on Figure 7-1.

TABLE 1 GROUNDWATER OBSERVATIONS													
Well No.	CV2W	CV3W	CV4W	CV5W	CV6W	CV7W	CV8W	CV9W	CV10W	CV11W	CV12W	CV13W	CV0W
Total Feet Depth	11.0	6.5	17.6	16.7	16.3	9.5	18.9	18.1	17.2	17.5	19.5	14.1	11.3
Ground Surface Elevation Feet	5520.2	5531.4	5481.3	5504.4	5482.1	5538.9	5495.7	5500.8	5465.1	5454.3	5481.2	5505.2	5525.1
Dry 12/13/79 Through 02/29/80													
DEPTH TO WATER LEVEL FROM GROUND SURFACE - FEET													
08/05/80	8.0	2.0	10.3	14.1	4.3	Dry	16.9	Dry	11.4	-	-	-	Dry
08/13/80	8.9	2.0	10.9	-	4.4	Dry	16.5	Dry	-	-	6.5	Dry	
08/20/80	8.5	1.4	10.8	13.3	4.0	Dry	16.5	Dry	8.6	4.4	6.2	Dry	
08/27/80	-	-	12.2	13.7	3.3	-	15.9	Dry	-	-	6.9	Dry	
08/29/80	10.1	2.0	12.2	11.2	-	Dry	15.8	Dry	9.0	4.8	6.5	Dry	
09/30/80	-	-	-	-	3.2	-	15.9	-	-	-	-	-	
09/04/80	Dry	2.2	11.0	13.2	-	Dry	15.9	Dry	Dry	4.4	6.5	Dry	
09/11/80	Dry	1.6	10.4	12.9	3.3	Dry	15.9	Dry	Dry	4.2	6.1	Dry	
06/05/81	-	-	-	-	3.8	Dry	-	Dry	Dry	3.2	4.3	Dry	
07/21/81	Dry	2.3	10.8	13.4	2.8	Muddy	-	Muddy	Dry	2.4	4.3	Muddy	
08/18/81	Dry	2.5	11.4	13.4	2.7	Muddy	-	Dry	Dry	3.2	5.4	Muddy	
09/14/81	Dry	2.7	-	14.4	2.4	Muddy	-	Dry	Muddy	3.8	5.8	Muddy	
10/27/81	Dry	1.4	10.5	13.1	1.6	Muddy	-	Dry	Dry	2.5	4.2	Muddy	
11/22/81	Dry	3.7	11.7	13.4	2.2	Muddy	15.7	Dry	Dry	-	5.8	Muddy	

TABLE 1 GROUNDWATER OBSERVATIONS													
Well No.	CV2W	CV3W	CV4W	CV5W	CV6W	CV7W	CV8W	CV9W	CV10W	CV11W	CV12W	CV13W	CV0W
Total Feet Depth	11.0	6.5	17.6	16.7	16.3	9.5	18.9	18.1	17.2	17.5	19.5	14.1	11.3
Ground Surface Elevation Feet	5520.2	5531.4	5481.3	5504.4	5482.1	5538.9	5495.7	5500.8	5465.1	5454.3	5481.2	5505.2	5525.1
Dry 12/13/79 Through 02/29/80													
DEPTH TO WATER LEVEL FROM GROUND SURFACE - FEET													
12/11/81	Dry	3.9	11.7	13.4	2.8	Muddy	16.8	Dry	Dry	4.2	6.1	Muddy	
01/19/82	Dry	4.9	14.9	14.2	2.5	Dry	16.8	Dry	Dry	4.4	6.7	Dry	
02/22/82	Dry	4.3	13.5	14.7	2.4	Dry	16.9	Dry	Dry	5.4	7.3	Dry	
03/22/82	Dry	4.7	11.6	14.3	2.4	Dry	17.0	Dry	Dry	5.9	-	Dry	
04/22/82	Dry	5.0	12.1	14.8	2.6	Dry	-	Dry	Dry	3.4	6.3	Dry	
05/29/82	Dry	3.2	12.5	14.3	2.2	Dry	-	Dry	Dry	2.1	-	Dry	
06/22/82	Dry	0.1	13.0	14.0	2.2	Dry	-	Dry	9.8	2.1	5.6	Dry	
07/20/82	Dry	1.5	11.7	14.5	1.0	Dry	-	Dry	9.9	0.6	5.9	Dry	
08/25/82	Dry	2.2	12.3	13.5	2.1	Dry	-	Dry	9.6	3.0	6.7	Dry	
09/23/82	Dry	3.0	13.0	14.0	2.7	Dry	-	Dry	6.2	3.6	7.1	Dry	
10/13/82	Dry	2.8	13.0	14.5	3.0	Dry	-	Dry	6.3	4.3	7.5	Dry	
11/21/82	Dry	-	-	-	-	Dry	-	Dry	-	-	-	Dry	
12/29/82	Dry	4.1	9.9	14.5	2.8	Dry	-	Dry	9.4	4.5	8.3	Dry	

**TABLE 7-1A
GROUNDWATER MONITORING WELLS**

Well No.	Location	Total Depth (Ft.)	Casing PVC	Completion	Hole Elevation
CV0W	N.W. Corner Permit	11.3	13.3	Capped	5525.1
CV2W*	W. Central Permit	11.0	11.0	Capped	5520.2
CV3W	So. Central Permit	6.5	8.5	Capped	5531.4
CV4W	N.E. Corner Permit	17.6	19.6	Capped	5481.3
CV5W	No. Central Permit	16.7	18.7	Capped	5504.4
CV6W	E. Central Permit	16.3	18.3	Capped	5482.1
CV7W	W. Central Permit	9.5	9.5	Capped	5538.9
CV8W	E. Central Permit	18.9	18.9	Capped	5495.7
CV9W	S.E. Corner Permit	18.1	18.1	Capped	5500.8
CV10W	S.E. Adj. Property	17.2	19.2	Capped	5465.1
CV11W	N.E. Adj. Property	17.5	19.5	Capped	5454.3
CV12W	No. Adj. Property	19.5	21.5	Capped	5481.2
CV13W	N. Central Adj. Property	14.1	14.1	Capped	5505.2
S-1-GW	N.E. Corner Permit	19.5	23.5	Active	5481.0
S-2-GW	E. Central Permit	21.5	25.5	Active	5488.2

Permeability

A pump test was performed using observation Well CV6W to estimate the permeability and storage coefficient associated with the water table aquifer in the area. Two additional observation wells were drilled fifteen feet and forty feet from Well CV6W. Well CV6W was then pumped at a constant rate and measurements of draw down versus time were recorded. Analysis of the data indicated a hydraulic conductivity K of 0.007 ft/min. and an apparent specific yield of 0.27. Pump test data and calculations are provided in Table 7-2.

These values are of the magnitude of those expected for silty sand and are somewhat high for the clay soils at the Savage Coal Terminal site. The geology of the area indicated that there might be local pockets of granular materials in the weathered clay. Lenses of sand were found in some of the bore holes made for foundation at the site. If one of these sand lenses exist in the area of the test well, it could influence the test.

Two test Wells, CV6D and CV5D were installed and sealed in the shale and used to determine the permeability of the shale. These were filled with water and the loss measured. There was no loss in the initial measuring period. It was concluded that the permeability was extremely low.

Ground Water Quality

From a review of published ground water quality data for the area, data was obtained for two sites relatively close to the Savage Coal Terminal facility. One site is a spring which is located close to Wellington on the opposite side of the Price River. The other site is located in Miller Creek at Highway 10 just southwest of the Savage Coal Terminal facility. At this site, water seepage through the soil profile into Miller Creek from the Carbon Canal was analyzed. The chemical analyses for these two sites are given in Table 7-3.

Three observation wells were drilled at the Savage Coal Terminal site in 1977 and the personnel at the facility collected ground water quality samples from these wells beginning in December, 1979.

Ten additional wells were drilled during the summer of 1980 in order to better characterize the shallow groundwater associated with the Savage Coal Terminal Facility. Chemical analysis of water samples taken from Savage Coal Terminal wells are reported in Tables 7-5 through 7-14. Also, water quality samples were taken from the French Drain at the pump house and are reported in Table 7-4.

Available data is presented separately for each station by two tables.

The first table for each well presents the results of field and laboratory chemical analyses for each sampling performed on that well. Those parameters for which concentrations are outside the standards for aquatic or agricultural use are also identified.

The second table for each well presents the quality standards for aquatic and agricultural use. This table summarizes chemical quality data by presenting the maximum, minimum and mean concentration including the standard deviation for each parameter for the period of record. The second table also summarizes the number of times each parameter exceeded the standard or limiting range for that particular parameter with respect to domestic, agricultural use. The source for quality standards for domestic, aquatic or agriculture used in the tables were determined from the numeric stream standards for the Price River below Castle Gate. There are no domestic standards for this reach of the Price River.

Ground water quality is generally poor and dominated by sodium sulfate. Seasonal variation in TDS or conductivity is found to occur in many of the wells. Some exhibit higher concentrations during the winter and spring than in summer or fall. In other wells, no definite pattern is discernible.

It should be noted that all of the above ground water monitoring wells have been removed and plugged as of May 1999. This was approved by the Division under an amendment to the plan. Two new ground water monitoring wells were installed in 2006.

**TABLE 7-2
PUMP TEST DATA**

Pertinent Information

Pumped Well: Well CV6W located on east side of Savage Coal Terminal site.
Date: Starting date was September 3, 1980.
Observation Wells: Two observation wells with $r = 14.3$ ft. and $r = 40$ ft.
Aquifer Thickness: $M = 10$ ft.
All wells are fully penetrating.

Analysis Results (Delayed drainage method)

Reference: Lohman (1979), Groundwater Hydraulics, USGS
Professional Paper 708, pp 34-40.

A log-log plot of drawdown, s , versus time, t , at the observation well at distance $r = 14.3$ ft. was prepared. This plot was superimposed on Plate 8 from Lohman (1979) and a match point obtained for the best match with the curve $r/8 = 1.5$. The four parameters at the match point are:

s	=	4.56 ft.
t	=	197 min.
$4 \pi t s / Q$	=	1.0
$4 T t / r^2 S_e$	=	1.0

The corresponding values for Transmissivity, T , and specific yield, are obtained by solution of equation (109) and (110) Lohman (1979):

$$(109) T = \frac{(1.0)Q}{4 \pi s} = \frac{(1.0)(30) \text{ gal min}^{-1}}{(12.57)(4.56 \text{ ft})(7.48 \text{ gal ft}^3)}$$

$$T = 0.07 \text{ ft}^2 \text{ min}^{-1}$$

$$(110) S_e = \frac{4 T t}{r^2 (1.0)} = \frac{(4)(.07 \text{ ft}^2 \text{ min}^{-1})(197 \text{ min})}{(14.3 \text{ ft})^2 (1.0)}$$

$$S_e = 0.27$$

Hydraulic Conductivity is determined by dividing T by the aquifer thickness, M :

$$K = \frac{T}{M} = \frac{.07}{10} = 0.007 \text{ ft. min}^{-1}$$

TEST RESULTS			
Time Since Pumping Began (minutes)	Observed Drawdown in Well #1 (So) (feet)	Adjusted Drawdown (Sa) (feet)	Observed Drawdown in Well #2 (feet)
0	0.00	0.00	
11	0.00	0.00	
21	0.00	0.00	
26	0.01	0.01	
35	0.01	0.01	
45	0.01	0.01	
55	0.02	0.02	
85	0.02	0.02	
145	0.03	0.03	
205	0.04	0.04	
265	0.26	0.26	
267	0.35	0.34	
270	0.43	0.42	0.02
280	0.55	0.53	
290	0.68	0.66	
300	0.76	0.73	
310	0.86	0.82	0.02
325	1.00	0.95	
340	1.09	1.03	
355	1.17	1.10	0.05
385	1.29	1.21	0.05
415	1.38	1.28	0.05
445	1.43	1.33	
485	1.53	1.41	

TEST RESULTS			
Time Since Pumping Began (minutes)	Observed Drawdown in Well #1 (So) (feet)	Adjusted Drawdown (Sa) (feet)	Observed Drawdown in Well #2 (feet)
505	1.55	1.43	0.05
535	1.60	1.47	
565	1.65	1.51	0.08
625	1.74	1.59	
685	1.80	1.64	
750	1.84	1.67	0.08
805	1.85	1.68	
885	1.87	1.69	0.09
925	1.88	1.70	
985	1.87	1.69	
1045	1.88	1.70	0.09
1105	1.89	1.71	
1150	1.90	1.72	0.11

TABLE 7-3
GROUND-WATER CHEMICAL ANALYSES AT TWO SITES
NEAR THE SAVAGE COAL TERMINAL LOADING FACILITY

Parameter pH	Spring Near Wellington 7.1 Mg/l	Seepage Water at Miller Creek 7.8 Mg/l
Silica (SiO ₂)	31.00	7.3
Calcium (Ca)	215.00	397.0
Magnesium (mg)	19.00	319.0
Sodium (Na)	-	649.0
Potassium (K)	-	12.0
Bicarbonate (HCO ₃)	562.00	341.0
Carbonate (CO ₃)	-	0.0
Sulfate (SO ₃)	755.00	3010.0
Chloride (Cl)	43.00	161.0
Fluoride (F)	0.400	0.8
Nitrate (NO ₃)	0.54	0.0
Boron (B)	-	0.3
Dissolved solids	1708.00	4720.0
Hardness as CaCO ₃	739.00	2300.0
Noncarbonate hardness as CaCO ₃	-	2020.0

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)										Property: Savage Coal Terminal	
Latitude:	Section: # Township: TN Range: RW			County: Carbon							
Longitude:				State: Utah							
Elevation:							Country: U.S.A.				
Parameter Title	11/29/77	03/08/78	04/21/79	12/18/79	01/22/80	02/29/80	12/11/81				
Turbidity, N.T.U.	32.0	19.0	73.0	-	-	-	-	-			
Lab Conductivity @25C, micromhos/cm	21100	28500	-	11000	11000	5200	9300	20000			
Lab pH, std. Units	7.87	7.72	7.72	8.20	8.20	7.90	8.40	7.90			
TDS @ 180C, mg/l (lab.)	13700LA	18500LA	340	7150LA	7700LA	3430LA	6480LA	13500LA			
Total Alkalinity, mg/l (CaCO ₃)	366	360	222	-	-	-	-	-			
Total Hardness, mg/l (CaCO ₃)	2900	3100	252	-	-	-	-	-			
Arsenic, Total, mg/l (As)	0.001	0.001	0.002	-	-	-	-	-			
Bicarbonate, mg/l (HCO ₃)	447	439	271	-	-	-	-	-			
Barium, Total, mg/l (Ba)	0.110	0.340	0.130	-	-	-	-	-			
Baron, Total, mg/l (B)	1.10	0.880	0.100	-	-	-	-	-			
Cadmium, Total, mg/l (Cd)	0.020	0.001	<0.100	-	-	-	-	-			
Calcium, mg/l (Ca)	360	388	60.0	-	-	-	-	-			
Carbonate, mg/l (CO ₃)	0.010	0.010	0.010	-	-	-	-	-			

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)										Property: Savage Coal Terminal	
Latitude:	Section: #			County: Carbon							
Longitude:	Township: TN			State: Utah							
Elevation:	Range: RW			Country: U.S.A.							
Parameter Title	11/29/77	03/08/78	04/21/79	12/18/79	01/22/80	02/29/80	12/11/81	04/22/82			
Chloride, mg/l (Cl)	89.0	160	12.0	114	114	142	21.5	25.4			
Chromium, Total, mg/l (Cr)	0.041	0.080	<1.00	-	-	-	-	-			
Copper, Total, mg/l (Cu)	0.036	0.017	0.011	-	-	-	-	-			
Fluoride, mg/l (F)	0.760	0.380	0.190	-	-	-	-	-			
Phosphate, mg/l (PO ₄)	0.120	-	-	-	-	-	-	-			
Iron, Total, mg/l (Fe)	0.799	0.425	0.714	0.850	0.060	0.050	0.090	0.080			
Lead, Total, mg/l (Pb)	0.038	0.115	0.001	-	-	-	-	-			
Magnesium, mg/l (Mg)	480	511	24.5	-	-	-	-	-			
Manganese, Total, mg/l (Mn)	0.205	0.089	0.241	0.125	0.020	0.010	0.025	0.020			
Mercury, Total, mg/l (Hg)	<0.000	<0.000	<0.000	-	-	-	-	-			
Nickel, Total, mg/l (Ni)	0.001	0.004	<0.001	-	-	-	-	-			
Nitrate as N, mg/l (NO ₃)	9.10	2.80	0.140	1.20	9.80	6.30	3.77	3.47			
Nitrate as N, mg/l (NO ₂)	0.010	0.010	-	-	-	-	-	-			
-Potassium, mg/l (K)	18.9	54.2	1.72	-	-	-	-	-			

TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W (French Drain)										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	11/29/77	03/08/78	04/21/79	12/18/79	01/22/80	02/29/80	12/11/81	04/22/82			
Selenium, Total, mg/l (Se)	0.001	0.001	<0.001	-	-	-	-	-			
Silica, mg/l (SiO ₂)	7.80	7.00	10.5	-	-	-	-	-			
Silver, Total, mg/l (Ag)	0.033	0.039	<0.001	-	-	-	-	-			
Sulfate, mg/l (SO ₄)	9200	12400	41.0	7500	7600	5200	5700	7200			
Sodium, mg/l (Na)	3320LA	4790LA	19.8	-	-	-	-	-			
Zinc, Total, mg/l (Zn)	0.107	0.067	0.047	-	-	-	-	-			
TSS, mg/l	-	-	-	22.0	18.0	17.0	58.0	22.0			
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.										D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded	

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Parameter Title	08/25/82	09/23/82	10/13/82				
Turbidity, N.T.U.	-	-	-				
Lab Conductivity @25C, micromhos/cm	12700	13000	13100				
Lab pH, std. Units	7.60	7.57	7.87				
TDS @ 180C, mg/l (lab.)	12100LA	12200LA	12500LA				
Total Alkalinity, mg/l (CaCO ₃)	-	-	-				
Total Hardness, mg/l (CaCO ₃)	-	-	-				
Arsenic, Total, mg/l (As)	-	-	-				
Bicarbonate, mg/l (HCO ₃)	-	-	-				
Barium, Total, mg/l (Ba)	-	-	-				
Baron, Total, mg/l (B)	-	-	-				
Cadmium, Total, mg/l (Cd)	-	-	-				
Calcium, mg/l (Ca)	-	-	-				
Carbonate, mg/l (CO ₃)	-	-	-				

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)						Property: Savage Coal Terminal					
Latitude:			Section: #			County: Carbon					
Longitude:			Township: TN			State: Utah					
Elevation:			Range: RW			Country: U.S.A.					
Parameter Title	08/25/82	09/23/82	10/13/82								
Chloride, mg/l (Cl)	132	132	153								
Chromium, Total, mg/l (Cr)	-	-	-								
Copper, Total, mg/l (Cu)	-	-	-								
Fluoride, mg/l (F)	-	-	-								
Phosphate, mg/l (PO ₄)	-	-	-								
Iron, Total, mg/l (Fe)	0.330	45.0	3.80								
Lead, Total, mg/l (Pb)	-	-	-								
Magnesium, mg/l (Mg)	-	-	-								
Manganese, Total, mg/l (Mn)	<0.030	0.030	<0.030								
Mercury, Total, mg/l (Hg)	-	-	-								
Nickel, Total, mg/l (Ni)	-	-	-								
Nitrate as N, mg/l (NO ₃)	4.78	5.03	4.85								
Nitrate as N, mg/l (NO ₂)	-	-	-								
-Potassium, mg/l (K)	-	-	-								

TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W (French Drain)						Property: Savage Coal Terminal		
Latitude:	Section: #			County: Carbon				
Longitude:	Township: TN			State: Utah				
Elevation:	Range: RW			Country: U.S.A.				
Parameter Title	08/25/82	09/23/82	10/13/82					
Selenium, Total, mg/l (Se)	-	-	-					
Silica, mg/l (SiO ₂)	-	-	-					
Silver, Total, mg/l (Ag)	-	-	-					
Sulfate, mg/l (SO ₄)	8810	8850	9010					
Sodium, mg/l (Na)	-	-	-					
Zinc, Total, mg/l (Zn)	-	-	-					
TSS, mg/l	38.0	28.0	38.0					
" - " missing data				D - domestic standards exceeded				
" * " impossible data				L - aquatic standards exceeded				
Units are in mg/l, unless otherwise noted.				A - agricultural standards exceeded				

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.
Turbidity, N.T.U.	-	-	-	19.0	73.0	41.3	28.2
Lab Conductivity @25C, micromhos/cm	-	-	-	5200	28500	14500	6790
Lab pH, std. Units	-	8.50	9.00	7.57	8.40	7.90	0.264
TDS @ 180C, mg/l (lab.)	-	10 500	10 2000	340	18500LA	9790	5260
Total Alkalinity, mg/l (CaCO ₃)	-	-	-	222	366	316	81.5
Total Hardness, mg/l (CaCO ₃)	-	-	-	252	3100	2080	1590
Arsenic, Total, mg/l (As)	-	-	-	0.001	0.002	0.001	0.001
Bicarbonate, mg/l (HCO ₃)	-	-	-	271	447	386	99.4
Barium, Total, mg/l (Ba)	-	-	-	0.110	0.340	0.193	0.127
Baron, Total, mg/l (B)	-	-	-	0.100	1.10	0.693	0.525
Cadmium, Total, mg/l (Cd)	-	-	-	0.001	0.100	0.040	0.053

TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W (French Drain)				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards -- # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.
Calcium, mg/l (Ca)	-	-	-	60.0	388	269	182
Carbonate, mg/l (CO ₃)	-	-	-	0.010	0.010	0.010	0
Chloride, mg/l (Cl)	-	-	-	12.0	160	100	54.9
Chromium, Total, mg/l (Cr)	-	-	-	0.041	1.00	0.374	0.543
Copper, Total, mg/l (Cu)	-	-	-	0.011	0.036	0.021	0.013
Fluoride, mg/l (F)	-	-	-	0.190	0.760	0.443	0.290
Phosphate, mg/l (PO ₄)	-	-	-	0.120	0.120	0.120	-
Iron, Total, mg/l (Fe)	-	-	-	0.050	45.0	4.75	13.4
Lead, Total, mg/l (Pb)	-	-	5.00	0.001	0.115	0.051	0.058
Magnesium, mg/l (Mg)	-	-	-	24.5	511	340	272
Manganese, Total, mg/l (Mn)	-	-	-	0.010	0.241	0.075	0.081
Mercury, Total, mg/l (Hg)	-	-	0.200	0.000	0.000	0.000	0.000

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.
Nickel, Total, mg/l (Ni)	-	-	-	0.001	0.004	0.002	0.002
Nitrate as N, mg/l (NO ₃)	-	-	-	0.140	9.80	4.66	2.95
Nitrate as N, mg/l (NO ₂)	-	-	-	0.010	0.010	0.010	0
-Potassium, mg/l (K)	-	-	-	1.72	54.2	24.9	26.8
Selenium, Total, mg/l (Se)	-	-	-	0.001	0.001	0.001	0
Silica, mg/l (SiO ₂)	-	-	-	7.00	10.5	8.43	1.83
Silver, Total, mg/l (Ag)	-	-	-	0.001	0.039	0.024	0.020
Sulfate, mg/l (SO ₄)	-	-	-	41.0	12400	7410	3110
Sodium, mg/l (Na)	-	2 3000	2 200	19.8	4790LA	2710	2440
Zinc, Total, mg/l (Zn)	-	-	-	0.047	0.107	0.074	0.031
TSS, mg/l	-	-	-	17.0	58.0	30.1	13.9
" - " missing data	D - domestic standards exceeded						
" * " impossible data	L - aquatic standards exceeded						

**TABLE 7-4
HISTORICAL FRENCH DRAIN WATER QUALITY SUMMARY**

Water - Quality Data Report for Station: CV1W (French Drain)				Property: Savage Coal Terminal			
Latitude:	Section: # Township: TN Range: RW		County: Carbon State: Utah Country: U.S.A.				
Longitude:							
Elevation:							
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.
Units are in mg/l, unless otherwise noted.				A - agricultural standards exceeded			

TABLE 7-4a
FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W												Property: Savage Coal Terminal
Latitude:	Section: #					County: Carbon						
Longitude:	Township: TN					State: Utah						
Elevation:	Range: RW					Country: U.S.A.						
Parameter Title	05/08/07	11/12/07	05/29/08	11/17/08	06/16/09	11/18/09	06/15/10	11/17/10	4/12/11	11/16/11	12/8/11	
Depth to Water (ft)	3	3.06	6.1	4.4	4.9	7.5	2.7	4.98	15.34	2.94	4.12	
Water Temperature (C°)	14.3	9.5	16.2	8.2	18.5	7.6	21.2	7.4	11.6	8.8	8.1	
Field Conductivity (umhos/cm)	7720	5526	7910	6177	6400	3300	3800	4600	7500	3900	3700	
Field pH	8.21	8.59	8.26	8.66	8.06	8.9	8.13	7.55	8.14	8.29	8.23	
Acidity (mg/l)	<10	<10	<10	<10	<10	<10	<10	<5	12	<5	-	
Total Alkalinity (mg/l)	281	316	310	340	308	323	240	205	329	209	-	
Bicarbonate (as CaCO ₃) (mg/l)	281	316	310	340	308	323	238	203	329	209	-	
Carbonate (as CaCO ₃) (mg/l)	<10	<10	<10	<10	<10	<10	<10	<5	<5	<5	-	
Oil and Grease (mg/l)	<5	<5	<5	<5	<5	<5	<5	<5	17	-	3.2	
Total Suspended Solids (mg/l)	41	27	40	19	13	36	12	52	299	15	-	
Total Dissolved Solids (mg/l)	6973	4958	6945	5292	6113	3169	3594	4067	6901	3451	-	
Total Hardness (mg/l)	1726.38	1538.07	1708.54	1431.09	1491.18	1148.08	1165.11	1292	1572	1248	-	

TABLE 7-4a
FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W											Property: Savage Coal Terminal
Latitude:	Section: #					County: Carbon					
Longitude:	Township: TN					State: Utah					
Elevation:	Range: RW					Country: U.S.A.					
Parameter Title	05/08/07	11/12/07	05/29/08	11/17/08	06/16/09	11/18/09	06/15/10	11/17/10	4/12/11	11/16/11	12/8/11
Calcium (D) (mg/l)	340.6	289.1	316.8	248.4	222	220.8	221.7	240.27	251.3	253.4	-
Magnesium (D) (mg/l)	212.7	198.2	222.8	196.9	227.5	144.9	148.5	167.96	229.44	149.48	-
Sodium (D) (mg/l)	1484	1025	1640	1093	1373	612.7	670.9	803.01	1591.6	582.48	-
Potassium (D) (mg/l)	22.69	14.47	15.76	11.63	11.96	8.95	15.66	20.67	18.03	15.95	-
Sulfate (as SO ₄) (mg/l)	4320	4150	5570	3900	3090	1975	2510	2577	4387	2145	-
Chloride (mg/l)	141	126	175	107	111	71	117	117	167	97	-
Iron (T) (mg/l)	.623	.261	.509	.259	1.117	1.439	.182	.39	3.63	0.19	-
Manganese (T) (mg/l)	.101	.027	.149	.089	.057	.079	.022	.085	.105	0.04	-
"_" missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
"*" impossible data											
Units are in mg/l, unless otherwise noted.											

TABLE 7-4a
FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W					Property: Savage Coal Terminal		
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards -- # of Times Exceeded/Value							
Parameter Title	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.	
Depth to Water (ft)	-	-	2.7	15.34	5.367273	-	
Water Temperature (C°)	27.0	-	7.4	21.2	11.94545	-	
Field Conductivity (umhos/cm)	-	-	3300	7910	5503	-	
Field pH	9.0	9.0	7.55	8.9	8.274545	-	
Acidity (mg/l)	-	-	-	12	-	-	
Total Alkalinity (mg/l)	-	-	205	340	286.1	-	
Bicarbonate (as CaCO ₃) (mg/l)	-	-	203	340	285.7	-	
Carbonate (as CaCO ₃) (mg/l)	-	-	-	-	-	-	
Oil and Grease (mg/l)	-	-	-	17	-	-	
Total Suspended Solids (mg/l)	-	-	12	299	55.4	-	
Total Dissolved Solids (mg/l)	-	(10) 2000	3169	6973	5146.3	-	
Total Hardness (mg/l)	-	-	1148.08	1726.38	1432.045	-	

TABLE 7-4a
FRENCH DRAIN WATER QUALITY SUMMARY

Water - Quality Data Report for Station: CV1W				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards - # of Times Exceeded/Value							
Parameter Title	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.	
Calcium (D) (mg/l)	-	-	220.8	340.6	260.437	-	
Magnesium (D) (mg/l)	-	-	144.9	229.44	189.838	-	
Sodium (D) (mg/l)	-	-	582.48	1640	1087.569	-	
Potassium (D) (mg/l)	-	-	8.95	22.69	15.577	-	
Sulfate (as SO ₄) (mg/l)	-	(10) 200	1975	5570	3462.4	-	
Chloride (mg/l)	-	(8) 100	71	175	122.9	-	
Iron (T) (mg/l)	-	5.00	.182	3.63	0.86	-	
Manganese (T) (mg/l)	-	0.200	0.022	0.149	.0754	-	
" - " missing data				D - domestic standards exceeded			
" * " impossible data				L - aquatic standards exceeded			
Units are in mg/l, unless otherwise noted.				A - agricultural standards exceeded			

TABLE 7-4b
WELL S-2-GW QUALITY

Water - Quality Data Report for Station: S-2-GW											Property: Savage Coal Terminal		
Latitude:	Section: #					County: Carbon							
Longitude:	Township: TN					State: Utah							
Elevation:	Range: RW					Country: U.S.A.							
Parameter Title	02/20/07	05/08/07	08/14/07	11/12/07	03/27/08	05/29/08	09/10/08	11/17/08	03/12/09	06/16/09	09/16/09		
Depth to Water (ft)	9.1	13.9	13.9	14.89	13.38	14.01	14.34	13.4	15.14	15.3	15.9		
Water Temperature (C°)	11	14.4	16	13	7.9	12.6	16.1	14.1	13.5	16.5	17		
Field Conductivity (umhos/cm)	9060	14220	12250	11430	1108	6258	4151	8280	8000	5900	7600		
Field pH	7.67	7.7	7.64	8	8.13	8.13	8.44	8.18	8.2	7.88	8.18		
Acidity (mg/l)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Total Alkalinity (mg/l)	310	297	308	251	115	143	163	161	194	169	242		
Bicarbonate (as CaCO ₃) (mg/l)	310	297	308	251	115	143	163	161	194	169	242		
Carbonate (as CaCO ₃) (mg/l)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Oil and Grease (mg/l)	9	<5	-	<5	<5	<5	<5	<5	<5	<5	<5		
Total Suspended Solids	127	105	51	211	130	92	895	190	53	39	316		
Total Dissolved Solids (mg/l)	14544	14495	14591	11423	5903	6260	4065	5610	7096	6399	7446		
Total Hardness (mg/l)	2434.82	2944.53	3048.14	2690.8	1913.66	1770.06	1243.38	1968.67	1793.19	1906.74	1746.18		
Calcium (D) (mg/l)	349.4	363.5	402.4	428	441	395.2	279.6	387.5	360.1	393.7	348.2		

TABLE 7-4b
WELL S-2-GW QUALITY

Water - Quality Data Report for Station: S-2-GW											Property: Savage Coal Terminal
Latitude:	Section: #					County: Carbon					
Longitude:	Township: TN					State: Utah					
Elevation:	Range: RW					Country: U.S.A.					
Parameter Title	02/20/07	05/08/07	08/14/07	11/12/07	03/27/08	05/29/08	09/10/08	11/17/08	03/12/09	06/16/09	09/16/09
Magnesium (D) (mg/l)	379.4	482.5	496.2	393.9	197.3	190.2	132.4	243.1	217.1	224.3	212.9
Sodium (D) (mg/l)	3165	3563	3330	2706	1061	1153	839.9	1573	1667	1571	1616
Potassium (D) (mg/l)	15.88	18.15	18.01	15.3	9.02	9.04	7.57	12.35	10.72	9.6	11.17
Sulfate (as SO ₄) (mg/l)	7980	9550	9900	10700	4620	4870	3240	4310	5630	4240	4960
Chloride (mg/l)	270	263	273	247	151	143	79.9	103	126	107	114
Iron (T) (mg/l)	2.873	1.889	1.023	.944	2.253	2.307	9.092	2.149	1.57	1.648	6.407
Manganese (T) (mg/l)	0.85	1.201	1.522	1.888	0.201	0.562	0.574	1.886	2.359	2.53	2.296
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.											
D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded											

**TABLE 7-4b
WELL S-2-GW QUALITY**

Water - Quality Data Report for Station: S-2-GW											Property: Savage Coal Terminal
Latitude:	Section: #					County: Carbon					
Longitude:	Township: TN					State: Utah					
Elevation:	Range: RW					Country: U.S.A.					
Parameter Title	11/18/09	03/25/10	06/15/10	09/28/10	11/17/10	02/23/11	04/12/11	09/13/11	10/13/11	11/16/11	12/08/11
Depth to Water (ft)	15.85	15.16	15.46	15.68	15.65	15.01	15.03	14.51	14.38	14.41	14.34
Water Temperature (C°)	13.6	14.4	15.4	17.2	13.2	9.2	13.9	12.4	11.9	12.7	11.6
Field Conductivity (umhos/cm)	7900	3900	8400	8500	3000	3900	4800	7700	7800	5400	5100
Field pH	8.19	6.81	7.71	7.99	7.68	7.73	7.7	8.24	8.17	8.06	8.01
Acidity (mg/l)	<10	<10	<10	26	12	14	13	-	-	<1015	-
Total Alkalinity (mg/l)	281	250	238	283	164	166	162	-	-	213	-
Bicarbonate (as CaCO ₃) (mg/l)	281	250	238	283	164	166	162	-	-	213	-
Carbonate (as CaCO ₃) (mg/l)	<10	<10	<10	<5	<5	<5	<5	-	-	<5	-
Oil and Grease (mg/l)	<5	5	10	<5	25	17	8	4.86	3.76	-	3.24
Total Suspended Solids	69	688	968	95	1832	586	327	-	-	89	-
Total Dissolved Solids (mg/l)	10017	5814	3700	8501	2518	4003	4060	-	-	3688	-
Total Hardness (mg/l)	2175.69	1463.49	1349.88	2118	1057	1524	1583	-	-	1088	-
Calcium (D) (mg/l)	430	290.4	320.6	441.6	268.11	382.7	392.5	-	-	254.28	-

TABLE 7-4b
WELL S-2-GW QUALITY

Water - Quality Data Report for Station: S-2-GW											Property: Savage Coal Terminal
Latitude:	Section: #					County: Carbon					
Longitude:	Township: TN					State: Utah					
Elevation:	Range: RW					Country: U.S.A.					
Parameter Title	11/18/09	03/25/10	06/15/10	09/28/10	11/17/10	02/23/11	04/12/11	09/13/11	10/13/11	11/16/11	12/08/11
Magnesium (D) (mg/l)	267.6	179.3	133.4	246.5	94.12	138.13	146.91	-	-	110.16	-
Sodium (D) (mg/l)	2273	1300	615.2	1817.5	379.7	600.27	601.51	-	-	714.63	-
Potassium (D) (mg/l)	15.74	10.59	7.54	17.73	6.87	9.14	9.35	-	-	11.33	-
Sulfate (as SO ₄) (mg/l)	7460	4115	2810	5464	1516	2508	2494	-	-	2180	-
Chloride (mg/l)	141	85.9	78.9	129	45	61	64	-	-	113	-
Iron (T) (mg/l)	2.246	9.228	15.33	4.56	21.99	8.98	6.03	-	-	2.96	-
Manganese (T) (mg/l)	2.706	1.625	1.199	3.06	2.051	2.719	2.985	-	-	1.765	-
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.											
D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded											

TABLE 7-4c
WELL S-2-GW QUALITY SUMMARY

Water - Quality Data Report for Station: S-2-GW					Property: Savage Coal Terminal		
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards -- # of Times Exceeded/Value							
Parameter Title	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.	
Depth to Water (ft)	-	-	9.1	15.9	14.48348	-	
Water Temperature (C°)	27.0	-	7.9	17.2	13.45652	-	
Field Conductivity (umhos/cm)	-	-	1108	14220	7063.348	-	
Field pH	9.0	9.0	6.81	8.44	7.939565	-	
Acidity (mg/l)	-	-	-	26	-	-	
Total Alkalinity (mg/l)	-	-	115	130	216.3158	-	
Bicarbonate (as CaCO ₃) (mg/l)	-	-	115	130	216.3158	-	
Carbonate (as CaCO ₃) (mg/l)	-	-	-	-	-	-	
Oil and Grease (mg/l)	-	-	-	25	-	-	
Total Suspended Solids (mg/l)	-	-	39	1832	361.2105	-	
Total Dissolved Solids (mg/l)	-	(19) 2000	2518	14591	7375.421	-	
Total Hardness (mg/l)	-	-	1057	3048.14	1885.223	-	
Calcium (D) (mg/l)	-	-	254.28	441.6	365.6732	-	

TABLE 7-4c
WELL S-2-GW QUALITY SUMMARY

Water - Quality Data Report for Station: S-2-GW					Property: Savage Coal Terminal		
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards - # of Times Exceeded/Value							
Parameter Title	Aquatic (3C)	Agricultural (4)	Min.	Max.	Mean	Std. Dev.	
Magnesium (D) (mg/l)	-	-	94.12	496.2	236.0747	-	
Sodium (D) (mg/l)	-	-	379.7	3563	1607.722	-	
Potassium (D) (mg/l)	-	-	6.87	18.15	11.84737	-	
Sulfate (as SO ₄) (mg/l)	-	(19) 200	1516	10700	5186.684	-	
Chloride (mg/l)	-	(12) 100	45	273	136.5632	-	
Iron (T) (mg/l)	-	(7) 5.00	0.944	21.99	5.446263	-	
Manganese (T) (mg/l)	-	(19) 0.200	2.01	3.06	1.788368	-	
D - domestic standards exceeded							
L - aquatic standards exceeded							
A - agricultural standards exceeded							
Units are in mg/l, unless otherwise noted.							

**TABLE 7-5
WELL CV2W QUALITY**

Water - Quality Data Report for Station: CV2W						Property: Savage Coal Terminal		
Latitude:	Section: #					County: Carbon		
Longitude:	Township: TN					State: Utah		
Elevation:	Range: RW					Country: U.S.A.		
Parameter Title	02/29/80	03/14/80	06/24/80	07/21/80	08/26/80			
Lab pH, std. Units	7.80	7.40	7.80	7.70	7.40			
Field Temperature, deg. C.	-	-	-	-	-			
Lab Conductivity @25C, micromhos/cm	3400	3200	7100	10800	7850			
TDS @ 180C, mg/l (lab.)	2240A	2100A	4620A	7000A	5500A			
TSS, mg/l	2540	866	980	404	238			
Iron, Total, mg/l (Fe)	2.55	1.09	3.61	3.20	0.330			
Manganese, Total, mg/l (Mn)	0.470A	0.260A	0.580A	0.120	0.320A			
Nitrate as N, mg/l (NO ₃)	4.20	4.50	17.7	19.0	90.0			
Sulfate, mg/l (SO ₄)	3200A	5300A	3100A	2550A	1550A			
Chloride, mg/l (Cl)	8.00	6.40	124A	132A	128A			
" - " missing data						D - domestic standards exceeded		
" * " impossible data						L - aquatic standards exceeded		
Units are in mg/l, unless otherwise noted.						A - agricultural standards exceeded		

TABLE 7-5a
WELL CV2W QUALITY SUMMARY

Water - Quality Data Report for Station: CV2W					Property: Savage Coal Terminal		
Latitude:	Section: #		County: Carbon				
Longitude:	Township: TN		State: Utah				
Elevation:	Range: RW		Country: U.S.A.				
Quality Standards - # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	7.40	7.80	7.62	0.205
Field Temperature, deg. C.	-	27.0	-	-	-	-	-
Lab Conductivity @25C, micromhos/cm	-	-	-	3200	10800	6470	3210
TDS @ 180C, mg/l (lab.)	-	-	5 2000	2100A	7000A	4290	2120
TSS, mg/l	-	-	-	238	2540	1010	914
Iron, Total, mg/l (Fe)	-	-	5.00	0.330	3.61	2.16	1.40
Manganese, Total, mg/l (Mn)	-	-	4 0.200	0.120	0.580A	0.350	0.180
Nitrate as N, mg/l (NO ₃)	-	-	-	4.20	90.0	27.1	35.9
Sulfate, mg/l (SO ₄)	-	-	5 200	2550A	5300A	3340	1140
Chloride, mg/l (Cl)	-	-	3 100	6.40	132A	79.7	66.2
" - " missing data							
" * " impossible data							
Units are in mg/l, unless otherwise noted.							
D - domestic standards exceeded							
L - aquatic standards exceeded							
A - agricultural standards exceeded							

TABLE 7-6
WELL CV3W QUALITY

Water - Quality Data Report for Station: CV3W							Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon						
Longitude:	Township: TN			State: Utah						
Elevation:	Range: RW			Country: U.S.A.						
Parameter Title	12/13/79	01/22/80	02/29/80	03/14/80	04/16/80	05/01/80	06/26/80	07/21/80		
Lab pH, std. Units	8.10	-	-	7.60	7.00	7.40	7.70	7.60		
Field Temperature, deg. C.	-	-	-	-	-	-	-	-		
Lab Conductivity @25C, micromhos/cm	7900	5500	2400	2900	4850	5600	5200	4900		
TDS @ 180C, mg/l (lab.)	5100A	-	-	1890	3150A	3640A	3400A	3200A		
TSS, mg/l	112	50.0	280	87.3	25.0	25.0	29.0	92.0		
Iron, Total, mg/l (Fe)	0.169	0.030	1.52	0.330	0.036	0.036	1.85	0.520		
Manganese, Total, mg/l (Mn)	0.019	0.060	0.300A	0.150	0.045	0.020	0.420A	0.320		
Nitrate as N, mg/l (NO ₃)	0.120	0.440	0.320	0.580	0.250	0.220	0.100	0.170		
Sulfate, mg/l (SO ₄)	4200A	3000A	3300A	4000A	2300A	2850A	3000A	2730A		
Chloride, mg/l (Cl)	118A	70.0	68.0	72.0	66.0	68.0	58.0	54.0		
" - " missing data	D - domestic standards exceeded									
" * " impossible data	L - aquatic standards exceeded									
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded									

TABLE 7-6
WELL CV3W QUALITY

Water - Quality Data Report for Station: CV3W									Property: Savage Coal Terminal		
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	08/26/80	09/24/80	04/08/81	07/21/81	08/18/81	09/14/81	10/27/81	11/22/81			
Lab pH, std. Units	7.20	7.40	7.60	8.10	7.80	7.80	8.00	7.70			
Field Temperature, deg. C.	-	-	-	-	-	-	-	14.0			
Lab Conductivity @25C, micromhos/cm	3800	5800	4400	770	4700	4700	4760	4700		4700	
TDS @ 180C, mg/l (lab.)	2650A	3720A	2860A	3100A	3100A	3050A	3100A	3100A		3100A	
TSS, mg/l	58.0	76.0	69.0	101	38.0	61.0	88.0	65.0		65.0	
Iron, Total, mg/l (Fe)	0.550	0.580	0.420	0.510	0.340	0.400	0.760	0.570		0.570	
Manganese, Total, mg/l (Mn)	0.310A	0.064	0.500A	0.480A	0.170	0.165	0.140	0.260A		0.260A	
Nitrate as N, mg/l (NO ₃)	0.200	2.00	0.090	0.090	<0.010	3.35	0.180	0.130		0.130	
Sulfate, mg/l (SO ₄)	2820A	3300A	2690A	2600A	3000A	2040A	2400A	2520A		2520A	
Chloride, mg/l (Cl)	56.0	43.5	66.0	31.2	50.0	50.0	18.7	21.0		21.0	
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
" * " impossible data											
Units are in mg/l, unless otherwise noted.											

**TABLE 7-6
WELL CV3W QUALITY**

Water - Quality Data Report for Station: CV3W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	12/11/81	01/19/82	02/22/82	03/22/82	04/22/82	06/22/82	07/20/82	08/25/82			
Lab pH, std. Units	7.80	7.40	7.60	7.50	7.40	7.80	7.40	7.25			
Field Temperature, deg. C.	9.00	6.00	8.00	9.00	11.0	17.0	24.0	23.0			
Lab Conductivity @25C, micromhos/cm	4000	3400	5950	6400	4700	370	2800	4050			
TDS @ 180C, mg/l (lab.)	2730A	2210A	3880A	4120A	3100A	245	4010A	3780A			
TSS, mg/l	60.0	83.0	189	232	534	44.0	36.0	30.0			
Iron, Total, mg/l (Fe)	0.300	1.05	2.62	3.09	7.03A	0.090	0.295	0.600			
Manganese, Total, mg/l (Mn)	0.166	0.289A	0.765A	0.740A	0.730A	0.165	0.200	0.180			
Nitrate as N, mg/l (NO ₃)	0.030	0.090	0.070	<0.010	0.060	<0.010	0.090	1.18			
Sulfate, mg/l (SO ₄)	2610A	420A	105	1560A	450A	2190A	330A	2620A			
Chloride, mg/l (Cl)	22.1	23.5	18.2	21.4	42.1	12.1	21.6	32.0			
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
" * " impossible data											
Units are in mg/l, unless otherwise noted.											

TABLE 7-6
WELL CV3W QUALITY

Water - Quality Data Report for Station: CV3W						Property: Savage Coal Terminal	
Latitude:	Section: #					County: Carbon	
Longitude:	Township: TN					State: Utah	
Elevation:	Range: RW					Country: U.S.A.	
Parameter Title	09/23/82	10/13/82	11/21/82	12/29/82			
Lab pH, std. Units	7.06	7.02	7.36	7.74			
Field Temperature, deg. C.	16.0	13.0	-	7.00			
Lab Conductivity @25C, micromhos/cm	4330	4220	4180	4220			
TDS @ 180C, mg/l (lab.)	4280A	4090A	4150A	4260A			
TSS, mg/l	18.0	70.0	36.0	12.0			
Iron, Total, mg/l (Fe)	0.530	3.81	0.590	1.04			
Manganese, Total, mg/l (Mn)	0.140	<0.030	0.260A	0.240A			
Nitrate as N, mg/l (NO ₃)	1.17	1.28	0.150	0.120			
Sulfate, mg/l (SO ₄)	1390A	2900A	2820A	2580A			
Chloride, mg/l (Cl)	35.0	37.0	41.0	42.0			
" - " missing data	D - domestic standards exceeded						
" * " impossible data	L - aquatic standards exceeded						
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded						

TABLE 7-6a
WELL CV3W QUALITY SUMMARY

Water - Quality Data Report for Station: CV3W				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	7.00	8.10	7.55	0.306
Field Temperature, deg. C.	-	27.0	-	6.00	25.0	13.1	5.98
Lab Conductivity @25C, micromhos/cm	-	-	-	370	7900	4340	1550
TDS @ 180C, mg/l (lab.)	-	-	24 2000	245	5100A	3300	944
TSS, mg/l	-	-	-	12.0	534	92.9	107
Iron, Total, mg/l (Fe)	-	-	1 5.00	0.030	7.03A	1.06	1.50
Manganese, Total, mg/l (Mn)	-	-	13 0.200	0.019	0.765A	0.262	0.213
Nitrate as N, mg/l (NO ₃)	-	-	-	0.010	3.35	0.447	0.745
Sulfate, mg/l (SO ₄)	-	-	27 200	105	4200A	2380	1030
Chloride, mg/l (Cl)	-	-	1 100	12.1	118A	44.9	23.4
" - " missing data				D - domestic standards exceeded			
" * " impossible data				L - aquatic standards exceeded			
Units are in mg/l, unless otherwise noted.				A - agricultural standards exceeded			

TABLE 7-7
WELL CV4W QUALITY

Water - Quality Data Report for Station: CV4W										Property: Savage Coal Terminal		
Latitude:	Section: #				County: Carbon							
Longitude:	Township: TN				State: Utah							
Elevation:	Range: RW				Country: U.S.A.							
Parameter Title	08/26/80	09/24/80	04/08/81	07/21/81	08/18/81	09/14/81	10/27/81	11/22/81				
Lab pH, std. Units	7.50	7.60	7.60	8.20	7.60	8.30	8.00	7.30				
Field Temperature, deg. C.	-	-	-	-	-	-	-	12.0				
Lab Conductivity @25C, micromhos/cm	7800	2800	18000	14000	-	3500	4700	6700				
TDS @ 180C, mg/l (lab.)	5450A	1790	11700A	9100A	5000A	2300A	3050A	4400A				
TSS, mg/l	-	89.0	97.0	113	38.0	139	162	107				
Iron, Total, mg/l (Fe)	0.320	0.350	0.110	0.120	1.190	0.210	2.70	2.11				
Manganese, Total, mg/l (Mn)	0.155	0.520A	0.090	0.076	0.070	0.800A	0.150	0.360A				
Nitrate as N, mg/l (NO ₃)	0.720	0.380	6.10	1.19	0.380	1.38	0.880	0.080				
Sulfate, mg/l (SO ₄)	4050A	1530A	12600A	13800A	2550A	1230A	1980A	2100A				
Chloride, mg/l (Cl)	38.0	11.1	330A	250A	250A	70.0	48.1	49.3				
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded											
" * " impossible data												
Units are in mg/l, unless otherwise noted.												

**TABLE 7-7
WELL CV4W QUALITY**

Water - Quality Data Report for Station: CV4W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	12/11/81	01/19/82	02/22/82	03/22/82	04/22/82	05/29/82	06/22/82	07/20/82			
Lab pH, std. Units	7.40	7.20	7.70	7.60	7.50	7.30	7.40	7.40	7.40		
Field Temperature, deg. C.	11.0	9.00	10.0	10.0	12.0	10.0	12.0	12.0	19.0		
Lab Conductivity @25C, micromhos/cm	9900	8400	16600	0	29000	18500	16000	16000	16000		
TDS @ 180C, mg/l (lab.)	6950A	5500A	10800A	15600A	19100A	12100A	10500A	19900A	19900A		
TSS, mg/l	123	287	433	124	231	430	100	361	361		
Iron, Total, mg/l (Fe)	1.80	3.90	3.74	1.55	1.57	3.63	0.230	3.55	3.55		
Manganese, Total, mg/l (Mn)	0.145	0.310A	0.550A	0.300A	0.180	0.225A	0.190	0.218A	0.218A		
Nitrate as N, mg/l (NO ₃)	0.150	0.170	0.120	0.560	0.600	2.33	1.11	1.06	1.06		
Sulfate, mg/l (SO ₄)	3000A	237A	3.00	4500A	630A	5700A	3600A	300A	300A		
Chloride, mg/l (Cl)	46.6	36.9	38.8	38.1	26.2	47.6	32.7	35.0	35.0		
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
" * " impossible data											
Units are in mg/l, unless otherwise noted.											

**TABLE 7-7
WELL CV4W QUALITY**

Water - Quality Data Report for Station: CV4W							Property: Savage Coal Terminal		
Latitude:	Section: #			County: Carbon					
Longitude:	Township: TN			State: Utah					
Elevation:	Range: RW			Country: U.S.A.					
Parameter Title	08/25/82	09/23/82	10/13/82	11/21/82	12/29/82				
Lab pH, std. Units	7.26	7.06	6.85	7.43	7.68				
Field Temperature, deg. C.	14.0	17.0	13.0	-	9.00				
Lab Conductivity @25C, micromhos/cm	17800	18200	18200	18700	19100				
TDS @ 180C, mg/l (lab.)	18800A	19000A	19600A	19700A	19800A				
TSS, mg/l	256	64.0	126	82.0	50.0				
Iron, Total, mg/l (Fe)	5.97A	1.06	1.88	1.05	1.78				
Manganese, Total, mg/l (Mn)	0.510A	0.480A	0.440A	0.410A	0.030				
Nitrate as N, mg/l (NO ₃)	1.17	0.820	2.01	0.710	1.16				
Sulfate, mg/l (SO ₄)	13000A	13700A	13000A	13700A	11200A				
Chloride, mg/l (Cl)	220A	180A	202A	184A	234A				
"-" missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded								
"*" impossible data									
Units are in mg/l, unless otherwise noted.									

TABLE 7-7a
WELL CV4W QUALITY SUMMARY

Water - Quality Data Report for Station: CV4W				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	6.85	8.30	7.52	0.344
Field Temperature, deg. C.	-	27.0	-	9.00	19.0	12.2	3.02
Lab Conductivity @25C, micromhos/cm	-	-	-	2800	29000	13900	6810
TDS @ 180C, mg/l (lab.)	-	-	20 2000	1790	19900A	11400	6710
TSS, mg/l	-	-	-	38.0	433	171	121
Iron, Total, mg/l (Fe)	-	-	1 5.00	0.110	5.97A	1.80	1.61
Manganese, Total, mg/l (Mn)	-	-	12 0.200	0.030	0.800A	0.296	0.200
Nitrate as N, mg/l (NO ₃)	-	-	-	0.080	6.10	1.10	1.29
Sulfate, mg/l (SO ₄)	-	-	20 200	3.00	13800A	5830	5410
Chloride, mg/l (Cl)	-	-	8 100	11.1	330A	113	100
" - " missing data				D - domestic standards exceeded			
" * " impossible data				L - aquatic standards exceeded			
Units are in mg/l, unless otherwise noted.				A - agricultural standards exceeded			

**TABLE 7-8
WELL CV5W QUALITY**

Water - Quality Data Report for Station: CV5W										Property: Savage Coal Terminal	
Latitude:	Section: #					County: Carbon					
Longitude:	Township: TN					State: Utah					
Elevation:	Range: RW					Country: U.S.A.					
Parameter Title	08/26/80	09/24/80	01/04/81	02/03/81	03/04/81	04/08/81	07/21/81	08/18/81			
Lab pH, std. Units	7.40	7.60	7.40	7.60	7.60	7.60	7.63	8.00			
Field Temperature, deg. C.	-	-	-	-	-	-	-	-			
Lab Conductivity @25C, micromhos/cm	7800	9400	28500	17200	16000	18000	17000	15000			
TDS @ 180C, mg/l (lab.)	4900A	6020A	20000A	11200A	8540A	11700A	11000A	9750A			
TSS, mg/l	4680	401	254	2150	1940	1340	537	107			
Iron, Total, mg/l (Fe)	0.620	0.620	0.230	8.80A	2.10	0.460	0.380	0.090			
Manganese, Total, mg/l (Mn)	0.200	0.430	0.700A	0.650A	1.10A	1.10A	0.990A	0.040			
Nitrate as N, mg/l (NO ₃)	0.120	0.080	<0.010	0.130	0.070	0.130	0.070	<0.010			
Sulfate, mg/l (SO ₄)	3400A	5700A	26600A	9900A	12000A	10800A	06400A	11100A			
Chloride, mg/l (Cl)	116A	180A	570A	202A	180A	200A	238A	240A			
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
" * " impossible data											
Units are in mg/l, unless otherwise noted.											

TABLE 7-8
WELL CV5W QUALITY

Water - Quality Data Report for Station: CV5W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	09/14/81	10/27/81	11/22/81	12/11/81	01/19/82	02/22/82	03/22/82	04/22/82			
Lab pH, std. Units	8.00	8.30	8.10	7.80	7.70	7.90	7.60	7.80			
Field Temperature, deg. C.	-	-	12.0	12.0	10.0	11.0	12.0	13.0			
Lab Conductivity @25C, micromhos/cm	16600	24600	18000	15400	15300	29000	24000	32000			
TDS @ 180C, mg/l (lab.)	10800A	16000A	17000A	10800A	9990A	19600A	15700A	21100A			
TSS, mg/l	231	417	573	1260	1810	658	6770	15800			
Iron, Total, mg/l (Fe)	0.095	1.75	3.25	5.15A	5.40A	2.49	24.0A	0.120			
Manganese, Total, mg/l (Mn)	0.025	0.500A	0.620A	0.620A	0.490A	1.25A	1.50A	2.10A			
Nitrate as N, mg/l (NO ₃)	0.290	0.100	0.480	0.140	0.110	0.130	3.69	0.120			
Sulfate, mg/l (SO ₄)	6600A	228A	8100A	129	0.174	3.00	4800A	570A			
Chloride, mg/l (Cl)	240A	17.7	18.2	20.0	24.1	21.9	17.4	39.0			
"-" missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
"*" impossible data											
Units are in mg/l, unless otherwise noted.											

TABLE 7-8
WELL CV5W QUALITY

Water - Quality Data Report for Station: CV5W									Property: Savage Coal Terminal			
Latitude:	Section: #				County: Carbon							
Longitude:	Township: TN				State: Utah							
Elevation:	Range: RW				Country: U.S.A.							
Parameter Title	05/29/82	06/22/82	07/20/82	08/25/82	09/23/82	10/13/82	11/21/82	12/29/82				
Lab pH, std. Units	7.60	7.80	7.80	7.94	7.71	7.50	7.85	7.90				
Field Temperature, deg. C.	13.0	13.0	19.0	15.0	16.0	12.0	-	11.0				
Lab Conductivity @25C, micromhos/cm	32000	19500	13200	15000	15500	14800	15400	16500				
TDS @ 180C, mg/l (lab.)	20800A	12900A	1890	15700A	16400A	15900A	16500A	16800A				
TSS, mg/l	1380	375	1190	112	256	208	742	64.0				
Iron, Total, mg/l (Fe)	17.8A	0.380	0.395	3.60	1.67	16.0A	0.780	2.12				
Manganese, Total, mg/l (Mn)	3.70A	0.200	0.220A	0.900A	0.230A	1.50A	0.170	0.540A				
Nitrate as N, mg/l (NO ₃)	0.120	<0.010	0.080	0.320	0.540	0.610	0.550	0.810				
Sulfate, mg/l (SO ₄)	6900A	3300A	450A	11200A	11400A	1130A	3200A	9570A				
Chloride, mg/l (Cl)	13.4	38.7	22.6	152A	144A	153A	159A	178A				
" - " missing data									D - domestic standards exceeded			
" * " impossible data									L - aquatic standards exceeded			
Units are in mg/l, unless otherwise noted.									A - agricultural standards exceeded			

TABLE 7-8a
WELL CV5W QUALITY SUMMARY

Water - Quality Data Report for Station: CV5W				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards -- # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	7.40	8.30	7.76	0.220
Field Temperature, deg. C.	-	27.0	-	10.0	19.0	13.0	2.42
Lab Conductivity @25C, micromhos/cm	-	-	-	7000	32000	18500	6530
TDS @ 180C, mg/l (lab.)	-	-	23 2000	1890	21100A	13400	5090
TSS, mg/l	-	-	-	64.0	15800	1800	3370
Iron, Total, mg/l (Fe)	-	-	6 5.00	0.090	24.0A	4.10	6.34
Manganese, Total, mg/l (Mn)	-	-	19 0.200	0.025	3.70A	0.824	0.806
Nitrate as N, mg/l (NO ₃)	-	-	-	0.010	3.69	0.363	0.741
Sulfate, mg/l (SO ₄)	-	-	21 200	0.174	26600A	6810	6380
Chloride, mg/l (Cl)	-	-	14 100	13.4	570A	133	126

" - " missing data
 " * " impossible data
 Units are in mg/l, unless otherwise noted.

D - domestic standards exceeded
 L - aquatic standards exceeded
 A - agricultural standards exceeded

TABLE 7-9
WELL CV6W QUALITY

Water - Quality Data Report for Station: CV6W										Property: Savage Coal Terminal			
Latitude:	Section: #				County: Carbon								
Longitude:	Township: TN				State: Utah								
Elevation:	Range: RW				Country: U.S.A.								
Parameter Title	08/26/80	09/24/80	01/04/81	02/03/81	03/04/81	04/08/81	07/21/81	08/18/81					
Lab pH, std. Units	7.80	7.40	7.10	7.80	7.60	7.60	8.30	7.80					
Field Temperature, deg. C.	-	-	-	-	-	-	-	-					
Lab Conductivity @25C, micromhos/cm	14000	2200	2000	2850	2800	2900	1700	1520					
TDS @ 180C, mg/l (lab.)	9800A	1410	1470	1860	2340A	1890	1100	1000					
TSS, mg/l	226	47.0	109	314	176	164	107	16.0					
Iron, Total, mg/l (Fe)	0.530	0.540	-	3.00	1.62	1.50	1.63	0.050					
Manganese, Total, mg/l (Mn)	0.185	1.31A	0.040	0.039	0.110	0.080	0.075	0.020					
Nitrate as N, mg/l (NO ₃)	9.60	0.620	1.22	1.29	1.29	1.40	0.960	0.340					
Sulfate, mg/l (SO ₄)	12200A	1950A	600A	630A	-	765A	450A	1010A					
Chloride, mg/l (Cl)	234A	7.90	73.3	69.9	73.0	70.0	58.4	0.620					
" - " missing data									D - domestic standards exceeded				
" * " impossible data									L - aquatic standards exceeded				
Units are in mg/l, unless otherwise noted.									A - agricultural standards exceeded				

**TABLE 7-9
WELL CV6W QUALITY**

Water - Quality Data Report for Station: CV6W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	09/14/81	10/27/81	11/22/81	12/11/81	01/19/82	02/22/82	03/22/82	04/22/82			
Lab pH, std. Units	8.00	8.20	7.70	7.80	8.00	8.10	7.70	7.80			
Field Temperature, deg. C.	-	-	14.0	10.0	6.00	7.00	8.00	10.0			
Lab Conductivity @25C, micromhos/cm	1670	1380	1400	1600	1270	2400	1850	1800			
TDS @ 180C, mg/l (lab.)	1100	900	950	1100	825	1550	1200	1200			
TSS, mg/l	63.0	93.0	35.0	199	51.0	130	40.0	139			
Iron, Total, mg/l (Fe)	0.065	0.620	0.350	0.340	0.360	0.860	0.460	0.460			
Manganese, Total, mg/l (Mn)	0.018	0.040	0.030	0.053	0.035	0.030	0.020	0.040			
Nitrate as N, mg/l (NO ₃)	1.38	0.650	0.480	0.870	1.09	1.43	0.480	1.52			
Sulfate, mg/l (SO ₄)	720A	360A	1020A	510A	210A	300A	420A	330A			
Chloride, mg/l (Cl)	75.0	34.2	34.0	40.8	35.2	36.6	39.0	41.9			
" - " missing data									D - domestic standards exceeded		
" * " impossible data									L - aquatic standards exceeded		
Units are in mg/l, unless otherwise noted.									A - agricultural standards exceeded		

TABLE 7-9
WELL CV6W QUALITY

Water - Quality Data Report for Station: CV6W									Property: Savage Coal Terminal		
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	05/29/82	06/22/82	07/20/82	08/25/82	09/23/82	10/13/82	11/21/82	12/29/82			
Lab pH, std. Units	8.00	8.00	7.90	8.31	7.85	7.56	8.10	8.09			
Field Temperature, deg. C.	19.0	18.0	24.0	20.0	17.0	12.0	-	4.00			
Lab Conductivity @25C, micromhos/cm	800	560	590	790	790	620	1100	1250			
TDS @ 180C, mg/l (lab.)	526	365	488	380	425	440	585	845			
TSS, mg/l	122	52.0	66.0	38.0	92.0	36.0	48.0	8.00			
Iron, Total, mg/l (Fe)	2.21	0.110	0.140	1.38	1.35	3.68	-	1.02			
Manganese, Total, mg/l (Mn)	0.450A	0.020	0.023	0.030	0.030	<0.030	0.030	0.030			
Nitrate as N, mg/l (NO ₃)	0.110	<0.010	0.320	0.630	0.940	2.31	1.39	1.78			
Sulfate, mg/l (SO ₄)	420A	3900A	570A	187	156	158	270A	449A			
Chloride, mg/l (Cl)	18.1	7.50	14.5	14.0	15.0	15.0	22.0	25.0			
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
" * " impossible data											
Units are in mg/l, unless otherwise noted.											

TABLE 7-9a
WELL CV6W QUALITY SUMMARY

Water - Quality Data Report for Station: CV6W				Property: Savage Coal Terminal			
Latitude:	Section: #		County: Carbon				
Longitude:	Township: TN		State: Utah				
Elevation:	Range: RW		Country: U.S.A.				
Quality Standards - # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	7.10	8.31	7.85	0.283
Field Temperature, deg. C.	-	27.0	-	4.00	24.0	13.0	6.18
Lab Conductivity @25C, micromhos/cm	-	-	-	560	14000	2080	2640
TDS @ 180C, mg/l (lab.)	-	-	2 2000	365	9800A	1410	1860
TSS, mg/l	-	-	-	8.00	314	98.8	74.7
Iron, Total, mg/l (Fe)	-	-	5.00	0.050	3.68	1.01	0.968
Manganese, Total, mg/l (Mn)	-	-	2 0.200	0.018	1.31A	0.115	0.270
Nitrate as N, mg/l (NO ₃)	-	-	-	0.010	9.60	1.34	1.85
Sulfate, mg/l (SO ₄)	-	-	20 200	156	12200A	1200	2520
Chloride, mg/l (Cl)	-	-	1 100	0.620	234A	44.0	46.7
" - " missing data							
" * " impossible data							
Units are in mg/l, unless otherwise noted.							
D - domestic standards exceeded							
L - aquatic standards exceeded							
A - agricultural standards exceeded							

TABLE 7-10
WELL CV7W QUALITY

Water - Quality Data Report for Station: CV7W				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Parameter Title	08/26/80						
Lab pH, std. Units	7.60						
Field Temperature, deg. C.	-						
Lab Conductivity @25C, micromhos/cm	8570						
TDS @ 180C, mg/l (lab.)	6000A						
TSS, mg/l	1260						
Iron, Total, mg/l (Fe)	0.480						
Manganese, Total, mg/l (Mn)	0.265A						
Nitrate as N, mg/l (NO ₃)	0.010						
Sulfate, mg/l (SO ₄)	3450A						
Chloride, mg/l (Cl)	64.0						
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.				D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded			

TABLE 7-10a
WELL CV7W QUALITY SUMMARY

Water - Quality Data Report for Station: CV7W					Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon				
Longitude:	Township: TN			State: Utah				
Elevation:	Range: RW			Country: U.S.A.				
Quality Standards -- # of Times Exceeded/Value								
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.	
Lab pH, std. Units	-	9.00	9.00	7.60	7.60	7.60	-	
Field Temperature, deg. C.	-	27.0	-	-	-	-	-	
Lab Conductivity @25C, micromhos/cm	-	-	-	8570	8570	8570	-	
TDS @ 180C, mg/l (lab.)	-	-	1 2000	6000A	6000A	6000	-	
TSS, mg/l	-	-	-	1260	1260	1260	-	
Iron, Total, mg/l (Fe)	-	-	5.00	0.480	0.480	0.480	-	
Manganese, Total, mg/l (Mn)	-	-	1 0.200	0.265A	0.265A	0.265	-	
Nitrate as N, mg/l (NO ₃)	-	-	-	0.010	0.010	0.010	-	
Sulfate, mg/l (SO ₄)	-	-	1 200	3450A	3450A	3450	-	
Chloride, mg/l (Cl)	-	-	100	64.0	64.0	64.0	-	
" - " missing data	D - domestic standards exceeded							
" * " impossible data	L - aquatic standards exceeded							
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded							

TABLE 7-11
WELL CV8W QUALITY

Water - Quality Data Report for Station: CV8W										Property: Savage Coal Terminal		
Latitude:	Section: #				County: Carbon							
Longitude:	Township: TN				State: Utah							
Elevation:	Range: RW				Country: U.S.A.							
Parameter Title	01/04/81	02/03/81	03/04/81	04/08/81	11/22/81	12/11/81	01/19/82	02/22/82				
Lab pH, std. Units	7.00	7.60	7.40	7.80	7.80	7.60	7.50	7.60	7.60			
Field Temperature, deg. C.	-	-	-	-	-	12.0	10.0	14.0	14.0			
Lab Conductivity @25C, micromhos/cm	14000	14500	16000	17000	16800	14800	12200	23000A	23000A			
TDS @ 180C, mg/l (lab.)	9800A	9450A	8550A	11100A	06000A	11100A	8000A	15100A	15100A			
TSS, mg/l	2200	2640	2820	1200	249	1260	110	5170	5170			
Iron, Total, mg/l (Fe)	0.090	18.5A	9.30A	6.30A	1.40	5.00	9.25A	0.250	0.250			
Manganese, Total, mg/l (Mn)	0.770A	0.766A	0.680A	0.430A	0.220A	1.19A	0.225A	1.25A	1.25A			
Nitrate as N, mg/l (NO ₃)	1.10	1.83	1.86	2.00	2.62	4.04	3.63	3.89	3.89			
Sulfate, mg/l (SO ₄)	9000A	6600A	9450A	10200A	8700A	9300A	156	6.00	6.00			
Chloride, mg/l (Cl)	122A	134A	136A	150A	21.4	22.6	40.2	42.2	42.2			
" - " missing data										D - domestic standards exceeded		
" * " impossible data										L - aquatic standards exceeded		
Units are in mg/l, unless otherwise noted.										A - agricultural standards exceeded		

TABLE 7-11
WELL CV8W QUALITY

Water - Quality Data Report for Station: CV8W				Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Parameter Title	03/22/82						
Lab pH, std. Units	7.60						
Field Temperature, deg. C.	14.0						
Lab Conductivity @25C, micromhos/cm	24000						
TDS @ 180C, mg/l (lab.)	15700A						
TSS, mg/l	6770						
Iron, Total, mg/l (Fe)	24.0A						
Manganese, Total, mg/l (Mn)	1.50A						
Nitrate as N, mg/l (NO ₃)	3.69						
Sulfate, mg/l (SO ₄)	4800A						
Chloride, mg/l (Cl)	27.7						
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.				D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded			

TABLE 7-11a
WELL CV8W QUALITY SUMMARY

Water - Quality Data Report for Station: CV8W				Property: Savage Coal Terminal			
Latitude: -	Section: #			County: Carbon			
Longitude:	Township: TN			State: Utah			
Elevation:	Range: RW			Country: U.S.A.			
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	7.00	7.80	7.54	0.240
Field Temperature, deg. C.	-	27.0	-	10.0	14.0	12.8	1.79
Lab Conductivity @25C, micromhos/cm	-	-	-	12200	24000	16900	4020
TDS @ 180C, mg/l (lab.)	-	-	9 2000	8000A	16000A	11600	3140
TSS, mg/l	-	-	-	110	6770	2490	2230
Iron, Total, mg/l (Fe)	-	-	5 5.00	0.090	24.0A	8.23	8.27
Manganese, Total, mg/l (Mn)	-	-	9 0.200	0.220A	1.50A	0.781	0.456
Nitrate as N, mg/l (NO ₃)	-	-	-	1.10	4.04	2.74	1.09
Sulfate, mg/l (SO ₄)	-	-	7 200	6.00	10200A	6470	3980
Chloride, mg/l (Cl)	-	-	4 100	21.4	150A	77.3	56.0
" - " missing data	D - domestic standards exceeded						
" * " impossible data	L - aquatic standards exceeded						
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded						

TABLE 7-12
WELL CV10W QUALITY

Water - Quality Data Report for Station: CV10W					Property: Savage Coal Terminal				
Latitude:	Section: #				County: Carbon				
Longitude:	Township: TN				State: Utah				
Elevation:	Range: RW				Country: U.S.A.				
Parameter Title	08/26/80	04/08/81	06/22/82	07/20/82	08/25/82	09/23/82	10/13/82	11/21/82	
Lab pH, std. Units	7.20	6.90	7.10	7.10	6.96	6.86	6.96	6.90	
Field Temperature, deg. C.	-	-	14.0	17.0	17.0	17.0	16.0	-	
Lab Conductivity @25C, micromhos/cm	2570	3600	3900	3610	5350	5700	4560	5500	
TDS @ 180C, mg/l (lab.)	1800	2340A	2590A	4630A	5130A	5300A	4400A	4780A	
TSS, mg/l	289	764	117	686	1040	236	78.0	829	
Iron, Total, mg/l (Fe)	1.04	11.7A	0.640	0.650	46.0A	4.23	0.320	14.5A	
Manganese, Total, mg/l (Mn)	0.250A	0.800	0.205A	0.195	0.900A	1.11A	0.830A	2.30A	
Nitrate as N, mg/l (NO ₃)	0.960	0.110	0.910	2.36	5.67	2.40	0.770	0.260	
Sulfate, mg/l (SO ₄)	915A	1860A	1770A	270A	3030A	1350A	2390A	2660A	
Chloride, mg/l (Cl)	0.540	128A	70.1	129A	306A	291A	264A	295A	
"-" missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded								
"**" impossible data									
Units are in mg/l, unless otherwise noted.									

TABLE 7-12
WELL CV10W QUALITY

Water - Quality Data Report for Station: CV10W				Property: Savage Coal Terminal			
Latitude:				Section: #	County: Carbon		
Longitude:				Township: TN	State: Utah		
Elevation:				Range: RW	Country: U.S.A.		
Parameter Title	12/29/82						
Lab pH, std. Units	7.38						
Field Temperature, deg. C.	7.00						
Lab Conductivity @25C, micromhos/cm	5420						
TDS @ 180C, mg/l (lab.)	4460A						
TSS, mg/l	203						
Iron, Total, mg/l (Fe)	7.72A						
Manganese, Total, mg/l (Mn)	1.88A						
Nitrate as N, mg/l (NO ₃)	0.150						
Sulfate, mg/l (SO ₄)	2410A						
Chloride, mg/l (Cl)	286A						
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.				D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded			

TABLE 7-12a
WELL CV10W QUALITY SUMMARY

Water - Quality Data Report for Station: CV10W					Property: Savage Coal Terminal		
Latitude:	Section: #				County: Carbon		
Longitude:	Township: TN				State: Utah		
Elevation:	Range: RW				Country: U.S.A.		
Quality Standards – # of Times Exceeded/Value							
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.
Lab pH, std. Units	-	9.00	9.00	6.86	7.38	7.04	0.171
Field Temperature, deg. C.	-	27.0	-	7.00	17.0	14.7	3.93
Lab Conductivity @25C, micromhos/cm	-	-	-	2570	5700	4470	1100
TDS @ 180C, mg/l (lab.)	-	-	8 2000	1800	5300A	3940	1320
TSS, mg/l	-	-	-	78.0	1040	471	358
Iron, Total, mg/l (Fe)	-	-	4 5.00	0.320	46.0A	9.64	14.6
Manganese, Total, mg/l (Mn)	-	-	8 0.200	0.195	2.30A	0.941	0.739
Nitrate as N, mg/l (NO ₃)	-	-	-	0.110	5.67	1.51	1.78
Sulfate, mg/l (SO ₄)	-	-	9 200	270A	3030A	1850	886
Chloride, mg/l (Cl)	-	-	7 100	0.540	306A	197	116
" - " missing data	D - domestic standards exceeded						
" * " impossible data	L - aquatic standards exceeded						
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded						

TABLE 7-13
WELL CV11W QUALITY

Water - Quality Data Report for Station: CV11W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	08/26/80	09/24/80	01/04/81	02/03/81	03/04/81	07/21/81	08/18/81	09/14/81			
Lab pH, std. Units	7.90	8.10	7.40	8.00	7.80	8.20	8.30	8.40			
Field Temperature, deg. C.	-	-	-	-	-	-	-	-			
Lab Conductivity @25C, micromhos/cm	2400	24000	28500	31200	28000	30000	30000	30700			
TDS @ 180C, mg/l (lab.)	16800A	15400A	20000A	20300A	23500A	19500A	19600A	20000A			
TSS, mg/l	63.0	228	254	616	627	192	93.0	135			
Iron, Total, mg/l (Fe)	0.540	0.510	0.230	1.60	0.600	2.25	0.250	1.45			
Manganese, Total, mg/l (Mn)	0.185	0.359A	0.700A	0.710A	0.710	1.13A	0.810A	0.851A			
Nitrate as N, mg/l (NO ₃)	0.050	<0.010	<0.010	<0.010	<0.010	0.020	<0.010	0.270			
Sulfate, mg/l (SO ₄)	28200A	16500A	26600A	26700A	27600A	33000A	24000A	-			
Chloride, mg/l (Cl)	440A	540A	570A	479A	475A	502A	540A	520A			
" - " missing data	D - domestic standards exceeded										
" * " impossible data	L - aquatic standards exceeded										
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded										

TABLE 7-13
WELL CV11W QUALITY

Water - Quality Data Report for Station: CV11W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	10/27/81	11/22/81	12/11/81	01/19/82	02/22/82	03/22/82	04/22/82	05/29/82			
Lab pH, std. Units	8.40	8.20	8.20	8.40	8.40	7.90	7.80	7.80			
Field Temperature, deg. C.	-	13.0	9.00	8.00	7.00	7.00	10.0	16.0			
Lab Conductivity @25C, micromhos/cm	61000	31500	28000	28600	30000	83000	79000	73000			
TDS @ 180C, mg/l (lab.)	40000A	30000A	21800A	18600A	19000A	54100A	51600A	47500A			
TSS, mg/l	106	143	212	2280	150	55.0	119	127			
Iron, Total, mg/l (Fe)	0.620	0.800	0.420	0.480	0.560	0.520	0.350	0.400			
Manganese, Total, mg/l (Mn)	0.760A	0.900A	0.720	0.860A	1.25A	1.10A	0.800A	0.655A			
Nitrate as N, mg/l (NO ₃)	0.020	0.310	0.350	<0.010	1.41	0.160	0.060	0.060			
Sulfate, mg/l (SO ₄)	129	9900A	30000A	<3.00	12.0	240A	66.0	3900A			
Chloride, mg/l (Cl)	13.9	21.9	33.1	14.2	19.4	15.3	18.5	10.3			
" - " missing data										D - domestic standards exceeded	
" * " impossible data										L - aquatic standards exceeded	
Units are in mg/l, unless otherwise noted.										A - agricultural standards exceeded	

TABLE 7-13
WELL CV11W QUALITY

Water - Quality Data Report for Station: CV11W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	06/22/82	07/20/82	08/25/82	09/23/82	10/13/82	11/21/82	12/29/82				
Lab pH, std. Units	7.90	7.90	7.82	7.66	7.49	7.92	7.92				
Field Temperature, deg. C.	18.0	25.0	20.0	20.0	15.0	-	5.00				
Lab Conductivity @25C, micromhos/cm	34000	32000	32000	34200	30800	32800	34000				
TDS @ 180C, mg/l (lab.)	22200A	46100A	40900A	46200A	40700A	42500A	41900A				
TSS, mg/l	37.0	160	102	104	92.0	152	86.0				
Iron, Total, mg/l (Fe)	0.220	0.270	0.900	0.860	1.95	0.930	0.920				
Manganese, Total, mg/l (Mn)	0.580A	0.620A	0.600A	0.590A	0.420A	0.740A	0.690A				
Nitrate as N, mg/l (NO ₃)	<0.010	<0.010	0.440	0.260	10.9	0.260	1.20				
Sulfate, mg/l (SO ₄)	4200A	240A	29100A	30900A	28600A	24500A	30700A				
Chloride, mg/l (Cl)	26.3	17.7	453A	460A	445A	460A	455A				
" - " missing data " * " impossible data Units are in mg/l, unless otherwise noted.										D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded	

TABLE 7-13a
WELL CV11W QUALITY SUMMARY

Water - Quality Data Report for Station: CV11W					Property: Savage Coal Terminal			
Latitude:		Section: #		County: Carbon				
Longitude:		Township: TN		State: Utah				
Elevation:		Range: RW		Country: U.S.A.				
Quality Standards -- # of Times Exceeded/Value								
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.	
Lab pH, std. Units	-	9.00	9.00	7.40	8.40	7.99	0.286	
Field Temperature, deg. C.	-	27.0	-	5.00	25.0	13.3	6.22	
Lab Conductivity @25C, micromhos/cm	-	-	-	2400	83000	36900	18800	
TDS @ 180C, mg/l (lab.)	-	-	23 2000	15400A	54100A	31200	13100	
TSS, mg/l	-	-	-	37.0	2280	267	464	
Iron, Total, mg/l (Fe)	-	-	5.00	0.220	2.25	0.767	0.553	
Manganese, Total, mg/l (Mn)	-	-	22 0.200	0.185	1.25A	0.728	0.239	
Nitrate as N, mg/l (NO ₃)	-	-	-	0.010	10.9	0.690	2.26	
Sulfate, mg/l (SO ₄)	-	-	18 200	3.00	33000A	17000	13300	
Chloride, mg/l (Cl)	-	-	13 100	10.3	570A	284	240	
" - " missing data	D - domestic standards exceeded							
" * " impossible data	L - aquatic standards exceeded							
Units are in mg/l, unless otherwise noted.	A - agricultural standards exceeded							

TABLE 7-14
WELL CV12W QUALITY

Water - Quality Data Report for Station: CV12W										Property: Savage Coal Terminal	
Latitude:	Section: #				County: Carbon						
Longitude:	Township: TN				State: Utah						
Elevation:	Range: RW				Country: U.S.A.						
Parameter Title	08/26/80	09/24/80	07/21/81	08/18/81	09/14/81	10/27/81	11/22/81	12/11/81			
Lab pH, std. Units	7.40	7.60	8.30	7.80	7.80	7.60	7.80	7.40			
Field Temperature, deg. C.	-	-	-	-	-	-	13.0	13.0			
Lab Conductivity @25C, micromhos/cm	6500	4200	4300	4300	4500	4500	5000	3700			
TDS @ 180C, mg/l (lab.)	4550A	2690A	2900A	2800A	2950A	2950A	2300A	2830A			
TSS, mg/l	208	4.00	271	42.0	81.0	53.0	57.0	86.0			
Iron, Total, mg/l (Fe)	0.490	0.456	0.850	0.130	2.35	0.460	0.330	0.140			
Manganese, Total, mg/l (Mn)	0.160	0.910A	1.19A	2.08A	1.23A	2.45A	2.20	2.85A			
Nitrate as N, mg/l (NO ₃)	<0.010	0.010	0.560	0.430	1.78	0.180	0.150	0.230			
Sulfate, mg/l (SO ₄)	1800A	2870A	2400A	2400A	2220A	2160A	201A	2700A			
Chloride, mg/l (Cl)	38.0	27.0	66.8	90.0	40.0	42.7	42.3	35.9			
" - " missing data									D - domestic standards exceeded		
" * " impossible data									L - aquatic standards exceeded		
Units are in mg/l, unless otherwise noted.									A - agricultural standards exceeded		

**TABLE 7-14
WELL CV12W QUALITY**

Water - Quality Data Report for Station: CV12W										Property: Savage Coal Terminal	
Latitude:	Section: #			County: Carbon							
Longitude:	Township: TN			State: Utah							
Elevation:	Range: RW			Country: U.S.A.							
Parameter Title	01/19/82	02/22/82	03/22/82	04/22/82	06/22/82	07/20/82	08/25/82	09/23/82			
Lab pH, std. Units	7.50	7.50	7.30	7.20	7.40	7.30	7.22	7.09			
Field Temperature, deg. C.	10.0	10.0	11.0	10.0	13.0	19.0	18.0	18.0			
Lab Conductivity @25C, micromhos/cm	3300	5200	64000	4500	3800	3400	3900	4100			
TDS @ 180C, mg/l (lab.)	2180A	4790A	4210A	2980A	2500A	4350A	3970A	4190A			
TSS, mg/l	181	51.0	53.0	56.0	48.0	84.0	44.0	24.0			
Iron, Total, mg/l (Fe)	0.280	0.430	0.480	0.390	0.090	0.155	1.38	0.440			
Manganese, Total, mg/l (Mn)	2.18A	0.650A	0.300A	0.440A	0.125	0.130	3.60A	5.43A			
Nitrate as N, mg/l (NO ₃)	0.170	<0.010	<0.010	0.130	0.090	<0.010	7.97	3.19			
Sulfate, mg/l (SO ₄)	240A	75.0	1260A	420A	2520A	300A	2690A	1320A			
Chloride, mg/l (Cl)	20.1	19.1	32.3	31.8	27.5	27.7	46.0	42.0			
" - " missing data	D - domestic standards exceeded L - aquatic standards exceeded A - agricultural standards exceeded										
" * " impossible data											
Units are in mg/l, unless otherwise noted.											

TABLE 7-14
WELL CV12W QUALITY

Water - Quality Data Report for Station: CV12W					Property: Savage Coal Terminal				
Latitude:	Section: #				County: Carbon				
Longitude:	Township: TN				State: Utah				
Elevation:	Range: RW				Country: U.S.A.				
Parameter Title	10/13/82	11/21/82	12/29/82						
Lab pH, std. Units	7.00	7.51	7.43						
Field Temperature, deg. C.	16.0	-	7.00						
Lab Conductivity @25C, micromhos/cm	4050	4790	4330						
TDS @ 180C, mg/l (lab.)	4220A	4330A	4090A						
TSS, mg/l	58.0	30.0	28.0						
Iron, Total, mg/l (Fe)	3.30	0.210	2.82						
Manganese, Total, mg/l (Mn)	6.11A	5.57A	2.36A						
Nitrate as N, mg/l (NO ₃)	3.20	0.790	0.300						
Sulfate, mg/l (SO ₄)	2700A	2700A	2680A						
Chloride, mg/l (Cl)	42.0	40.0	25.0						
" - " missing data					D - domestic standards exceeded				
" * " impossible data					L - aquatic standards exceeded				
Units are in mg/l, unless otherwise noted.					A - agricultural standards exceeded				

TABLE 7-14a
WELL CV12W QUALITY SUMMARY

Water - Quality Data Report for Station: CV12W					Property: Savage Coal Terminal			
Latitude:	Section: #			County: Carbon				
Longitude:	Township: TN			State: Utah				
Elevation:	Range: RW			Country: U.S.A.				
Quality Standards - # of Times Exceeded/Value								
Parameter Title	Domestic	Aquatic (3C)	Agriculture (4)	Min.	Max.	Mean	Std. Dev.	
Lab pH, std. Units	-	9.00	9.00	7.00	8.30	7.48	0.300	
Field Temperature, deg. C.	-	27.0	-	7.00	19.0	13.2	3.83	
Lab Conductivity @25C, micromhos/cm	-	-	-	3300	64000	7490	13700	
TDS @ 180C, mg/l (lab.)	-	-	19 2000	2180A	4970A	3510	835	
TSS, mg/l	-	-	-	4.00	271	76.8	68.6	
Iron, Total, mg/l (Fe)	-	-	5.00	0.090	3.30	0.799	0.960	
Manganese, Total, mg/l (Mn)	-	-	16 0.200	0.125	6.11A	2.10	1.90	
Nitrate as N, mg/l (NO ₃)	-	-	-	0.010	7.97	1.01	1.96	
Sulfate, mg/l (SO ₄)	-	-	18 200	75.0	2870A	1770	1040	
Chloride, mg/l (Cl)	-	-	100	18.1	90.0	38.7	16.5	
" - " missing data					D - domestic standards exceeded			
" * " impossible data					L - aquatic standards exceeded			
Units are in mg/l, unless otherwise noted.					A - agricultural standards exceeded			

724.200. Surface Water Hydrology

Methodology

A hydrologic investigation was performed based on state and federal agency data, baseline monitoring data, and field reconnaissance. The investigation focused on the following:

- a) The surface hydrology was characterized with descriptions of drainage basin features, including storm runoff estimates, irrigation patterns and canal usage and seepage estimates. Irrigation district and local soil conservation personnel were contacted to determine irrigation practices in the area.
- b) Baseline water quality parameters and surface runoff quantity from undisturbed areas were estimated. A monitoring station, CV14W shown on Plate 7-1, was established. This station was sampled monthly, when possible, during the baseline monitoring period in order to characterize surface water quality. Due to the ephemeral nature of surface water flow at Savage Coal Terminal, flow measurements cannot be taken at any regular interval and consequently water quality samples are sporadic.
- c) Water and sediment control measures were designed to minimize adverse impacts of operations on receiving waters.

Regional Surface Water Hydrology

The Department of the Interior has drafted a regional environmental statement, published in 1978, which covers the development of coal resources in Central Utah. The regional area is drained by tributaries to the Green and Colorado Rivers; principal tributaries are the Price and San Rafael Rivers and Muddy Creek. The flow is usually intermittent or perennial, in small streams in the mountains and in larger streams that originate in the higher mountains. Snowmelt is major contributor to streamflow and it provides the continuity of flow in the perennial streams as well as some seasonal flow to intermittent streams. Many streams are ephemeral and flow only in direct response to precipitation or snowmelt. Ephemeral flow is characteristic of the lowlands such as Castle Valley where the Savage Coal Terminal facility is located. Summer precipitation does not usually produce much runoff, although intense rainfall may cause high runoff in localized areas.

The Savage Coal Terminal site drains into the Price River which flows into the Green River. The water in the upper reaches of the Price River is of high quality; however, as the river traverses the central and lower portion of the Price River basin, the quality of the water in the river steadily degrades due to the geologic nature of the area and to the irrigation return flow which enters the river. Total dissolved solids concentrations are less than 400 mg/l in the upper reaches, but by the time the water reaches Wellington the total dissolved concentrations are between 600 and 2,400 mg/l. At Woodside, Utah which is 22 miles upstream from the mouth, average total dissolved solids range between 2,000 and 4,000 mg/l.

Chemical analysis of Price River water sampled near the Savage Coal Terminal water supply intake above Wellington is provided in Figure 7-2.

Water is diverted from the Price River into the Carbon and Price-Wellington Canals as it enters the central portion of the basin. The Carbon Canal trends north and south and passes within about one half mile of the Savage Coal Terminal Coal loading facility. This water is used for irrigation in the area and is of good quality since it is diverted as it leaves the upper portion of the basin. In the vicinity of the Savage Coal Terminal facility, the total dissolved concentration of water in the canal ranges between 250 and 600 mg/l. Water quality analysis of Carbon Canal Water is provided in Figure 7-3.

Flow in the Price River is affected by diversions of water, mainly for irrigation and by storage reservoirs. Interbasin diversions are common.

Canal Usage and Seepage Routes

The Carbon Canal located about one-half mile to the west and uphill from the Savage Coal Terminal site (see Figure 7-6) is used nearly year round. During the irrigation season, which extends from April to October, up to 140 cfs is diverted into the canal from the Price River. During the winter, up to 25 cfs is diverted into the canal for purposes of supplying stockwater with diversion discontinued at times when icing occurs. Seepage loss from the Carbon Canal in the vicinity of the Savage Coal Terminal site is estimated at 0.30 cfs per canal mile or about 65 acre-feet annual loss assuming flow 300 days per year. Seepage losses were estimated by a method proposed by Worstell (1976) which allows estimation of seepage

losses from canal length, canal width, and soil type.

The two lateral canals, one on the north and one on the south, are used mainly during the irrigation season during which time water is diverted from the Carbon Canal almost continuously (see Figure 7-6). The canal on the ridge to the south of the Savage Coal Terminal site is also used intermittently during the winter for purposes of providing stock water. Seepage loss from this canal is estimated at about 0.10 cfs per canal mile or about 45 acre-feet annual loss assuming flow 180 days per year. Seepage from the canal on the north is felt to not significantly affect the Savage Coal Terminal site.

Irrigation Patterns and Practices

The owners of the alfalfa fields adjacent to the Savage Coal Terminal site were contacted to determine irrigation patterns. They indicated that the fields are now irrigated at least two and up to three times per cutting with cutting occurring every 4 to 5 weeks. Irrigation begins sometime in April and the annual application is 3 to 4 acre feet per acre.

The water used to irrigate the fields is from the Carbon Canal and is of good quality. The total dissolved solids of this water ranges between 250 and 600 mg/l. There is no usage of groundwater for irrigation in the area at the present time and it is not anticipated that ground water will be used in the future due to its very poor quality.

There are no water intakes located within the permit area. One intake is located on the adjacent property; however, this intake is from the canal running south (upslope) of the property, and is located some 1200' from Savage Coal Terminal, across the county road and D. & R.G.W. railroad spur. The intake location and canal locations are shown on Figure 7-6.

Stream Channels

All stream channels in the vicinity of the site are of an ephemeral nature. The highest stream order which can be distinguished from aerial photographs for these ephemeral stream channels is 4. The banks and bottom sediments of many of the stream channels are covered by white salt deposits known as efflorescence.

Readily soluble salt efflorescences cover the bars, banks, and exposed pebbles of nearly all stream channels in the central portion of the Price River Basin. Efflorescences also accumulate on the general soil surface as soil water evaporates and accumulations can be especially heavy in areas where ground water is very close to the surface. Several of these areas of heavy accumulation of salt efflorescences occur at or near the Savage Coal Terminal site. These salt efflorescences are predominantly sodium and sulfate with significant amounts of magnesium (Utah Department of Natural Resources, 1972). Salt efflorescence is a major initial source of salinity in surface runoff, while the inherent characteristics of the soil determine the equilibrium salt output of a given hydrologic event (White, 1976).

Surface Water Quality

The U.S. Geological Survey in cooperation with the Utah Division of Water Rights conducted an investigation of the chemical quality of surface water in the Price River basin during 1969 and 1970. Water quality sampling was conducted at three sites during storm runoff on August 29, 1969 near the Savage Coal Terminal facility. Data which were obtained from these sites give a good indication as to the natural chemical quality of surface runoff which could be expected from Savage Coal Terminal site. The three sites include Drunkards Wash which is located several miles north of the Savage Coal Terminal, an unnamed creek located just south of Drunkards Wash, and Miller Creek which is located just south of the site. Total dissolved solids for storm runoff at these three sites was 2,770, 2,620, and 2,060 mg/l respectively. The chemical analyses of the samples from each site are given in Table 7-14b.

TABLE 7.14b
CHEMICAL ANALYSES OF STORM RUNOFF AT THREE SITES
NEAR THE SAVAGE COAL TERMINAL LOADING FACILITY

Parameter pH	Drunkards Wash at Highway 10 7.4 Mg/l	Unnamed Creek at Highway 10 7.5 Mg/l	Miller Creek near Wellington 8.0 Mg/l
Silica (SiO ₂)	14.00	-	5.80
Calcium (Ca)	430.00	337.00	164.00
Magnesium (mg)	102.00	71.00	117.00
Sodium (Na)	272.00	377.00	310.00
Potassium (K)	11.00	-	7.00
Bicarbonate (HCO ₃)	205.00	103.00	305.00
Carbonate (CO ₃)	0.00	0.00	0.00
Sulfate (SO ₃)	1810.00	1750.00	1260.00
Chloride (Cl)	25.00	30.00	46.00
Fluoride (F)	0.80	-	0.50
Nitrate (NO ₃)	0.60	0.40	4.30
Boron (B)	0.41	-	0.28
Dissolved solids	2770.00	2620.00	2060.00
Hardness as CaCO ₃	1490.00	1130.00	890.00
Noncarbonate hardness as CaCO ₃	1320.00	1050.00	640.00

TABLE 7-14c
CHEMICAL ANALYSIS OF SURFACE WATER
FROM DITCH NORTH OF SITE

<u>Station CV14W</u>	<u>12/13/79</u>	<u>1/23/80</u>	<u>2/29/80</u>
Turbidity NTU		No Data	
Conductivity	8,000.000	Water Froze	7,700.000
pH	8.100		8.200
TDS mg/l	5,200.000		1,750.000
Alkalinity CaCO ₃ mg/l			
Hardness CaCO ₃			
As			
HCO ₃			
Ba			
B			
Cd			
CO ₃			
Cl mg/l	110.000		94.000
Cr (Total)			
Cu			
Surfactants MBAS			
F			
PO ₄ -PI			
Fe (Total) mg/l	.160		.690
Fe (Filtered)			
Pb			
Mg			
Mn mg/l	.016		.060
Hg			
Ni			
NO ₃ -N mg/l	11.800		.280
NO ₂ -N			
K			
Se			
SiO ₂			
Ag			
SO ₄ mg/l	4,200.000		3,000.000
Na			
Zn			
Oil and Grease mg/l	17.000		144.700
Suspended Solids mg/l	42.000		111.000
Acidity			

The natural surface runoff in the area is of poor quality with total dissolved solids ranging from 2000 to 3000 mg/l. Surface runoff from most of the site occurs infrequently. The data in Table 7-14b is indicative of the water quality to be expected from the site. Water quality samples have been collected by the Company from a drainage ditch, Station CV14W, located at the northeast corner of the property. This drainage ditch receives natural runoff and irrigation return flows from the "undisturbed" watershed subarea A. The water quality analysis of samples taken from this drainage ditch are presented in Table 7-14c.

Irrigation water is of high quality with total dissolved solids of 200 to 600 mg/l. Levels of groundwater in the fields adjacent to the site are below the plant root zone. It would appear that irrigation practices in the area are designed to leach soluble salts from the soil resulting in high dissolved solids in irrigation return flows.

- 724.300. Geologic Information. Each application will include geologic information in sufficient detail, as given under R645-301-624, to assist in:
- 724.310. See Chapter 6 and Sections 724.100 and 724.200.
- 724.320. See Chapter 6 and Sections 724.100 and 724.200.
- 724.400. Climatological Information.

Existing Environment

Climate

The climate of the Price, Utah area is varied and strongly influenced by topography. The climate can be characterized as arid, specifically dry continental. The prevailing local low-level meteorological influences are mountain-valley breeze systems. The low amount of annual precipitation is a result of the Sierra Nevada and Cascade Ranges which act as natural barriers and prevent moist maritime air from the North Pacific from reaching the interior basins to the east.

On a more local scale the Wasatch Mountains to the west of Castle Valley and the Tavaputs Plateau to the north provide a shelter from storms associated with westerly and northerly winds. Areas on the lee side of the Wasatch Range generally receive less than 10 inches of precipitation annually.

The Savage Coal Terminal is located approximately 6 miles south of Price, Utah; therefore, climatological data for Price is representative of this site.

Table 7-15 is a tabulation of Temperature, Rainfall, and Snowfall for the Price area from 1992 through April 2002. This information was provided by the Utah Climate Center, Utah State University, Logan, Utah.

Precipitation and Temperature

Based on the data in Table 7-15, the average annual precipitation over the 10 year period was 10.36 inches, with a low monthly average precipitation of 0.36 inches in December and a high monthly average precipitation of 1.37 inches in August. The record high daily precipitation for this period was 1.99 inches, which occurred during August.

The average mean temperature for this area is 51.0° F. The average maximum annual temperature is 65.0° F. with a high maximum of 89.0° F in August and a low maximum of 36.1° F in January. The average minimum annual temperature is 37.0° F, with a high minimum occurring during July and a low minimum during January. The record high temperature is 101° F in June and the record low temperature is -4° F in January.

The average annual snowfall is 19.6 inches with measured amounts during the months of October through April. The record daily snow measured was 20.0 inches, which occurred in the month of January.

TABLE 7-15

Price Warehouses													
County: Carbon		Latitude: 39°37'		Longitude: 110°48'		Elevation: 5700 feet		Period: 1992 – 2002					
Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average max temp	36.1	42.4	58.9	71.5	76.8	83.3	88.1	89.0	80.9	65.1	46.9	39.0	65.0
Average min temp	14.4	21.5	31.9	43.1	47.8	50.2	54.7	57.0	47.3	37.6	22.4	16.8	37.0
Average mean temp	26.2	32.0	46.4	59.3	62.3	66.8	71.4	73.0	64.1	51.3	34.6	27.9	51.0
Record high temp	54	66	71	84	90	101	99	99	94	84	61	50	101
Record low temp	-4	4	19	23	28	33	42	41	35	26	4	0	-4
Average precipitation	0.92	0.96	0.66	0.81	0.91	0.68	0.70	1.37	1.14	1.34	0.52	0.36	10.36
Record monthly precipitation	2.36	1.99	1.54	2.01	2.34	2.14	1.86	4.21	3.12	2.70	1.26	1.17	4.21
Record daily precipitation	1.65	0.61	0.74	0.99	0.83	1.17	1.36	1.99	0.86	1.13	0.59	0.53	1.99
Average snowfall	7.9	4.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.1	2.7	3.8	19.6
Record monthly snow	31.6	10.7	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.5	7.8	16.5	31.6
Record daily snow	20.0	6.1	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.5	5.0	7.3	20.0

Wind

Winds are generally light to moderate all seasons of the year. Strongest winds generally occur in the spring with moderate to strong southerly flow for several days at a time. The prevailing Castle Valley area winds are from the north through north-northwest during autumn, winter and early spring months with a shift to the south-southeast during late spring and summer.⁽²⁾ Table 7-16 summarizes the mean wind speeds in Castle Valley. Depending on the proximity to the mountain and canyons a particular location in Castle Valley may experience pronounced diurnal wind flow patterns. Daytime flow may be influenced by upslope easterly winds caused by greater heating of the eastern face of the Wasatch Plateau than in the valley. At night the northwesterly drainage flow from the mountains to the valley may prevail. In summary, no one wind direction or diurnal wind flow pattern is applicable for all locations in Castle Valley. Weaker diurnal wind flow patterns are expected in locations further away from a canyon or mountain.

TABLE 7-16
MEAN SEASONAL WIND SPEEDS IN THE CASTLE VALLEY AREA

Direction	SEASON				
	Fall (m/s)	Winter (m/s)	Spring (m/s)	Summer (m/s)	Annual (m/s)
N	3.3	1.8	3.5	3.1	3.0
NNE	4.1	1.4	2.4	2.4	2.6
NE	2.2	1.6	1.6	1.9	1.8
ENE	1.8	1.3	1.6	2.1	1.6
E	1.8	1.3	1.9	1.9	1.7
ESE	1.8	1.4	2.4	2.1	1.9
SE	2.0	1.4	2.1	2.6	2.1
SSE	2.5	1.4	2.5	3.0	2.5
S	3.7	1.4	3.4	3.8	3.2
SSW	4.0	1.4	<u>6.2</u>	4.3	4.3
SW	3.1	1.3	4.0	3.9	3.2
WSW	2.9	1.3	4.3	3.9	3.2
W	2.9	1.7	4.0	3.8	3.1
WNW	2.3	2.0	5.3	<u>4.6</u>	3.9
NW	4.2	4.9	6.0	4.5	<u>5.1</u>
NNW	4.8	4.4	5.7	4.0	4.8
Seasonal Mean (m/s)	2.7	1.3	3.5	3.2	2.7

(To convert to miles/hour multiply by 2.2369)

Source: An evaluation of the Meteorology and Air Quality Impact for the Emery Plant, Emery County, Utah. A.J. Anderson and J.L. Sutherland, North American Weather Consultants, November

1974.

Evapotranspiration and Growing Season

The average annual evapotranspiration for this area is listed as 47.43 inches, with the maximum of 8.07 in July and the minimum of 0.85 in January.

The growing season, based on freeze-free dates, runs from 118 to 196 days, with an average of 147 days. The last spring freeze averages May 12 and the first fall freeze averages October 6.⁽¹⁾

Air Quality

The Savage Coal Terminal is a coal preparation facility which blends, sizes, and stores raw coal. Material handling, sizing and storage procedures and associated air pollution control problems are largely those of dust and particulate matter emitted from the mechanical processes. The only criteria pollutant which is expected to be emitted in quantity is suspended particulate matter. The only combustion processes associated with the facility will be those associated with mobile sources, which includes light duty vehicles, heavy duty vehicles, and train locomotive. The gaseous emissions emitted from these vehicles exhausts will have a negligible impact on the air quality of the area because the emissions levels are quite low.

Run-of-mine coal must be broken, sized and screened before loading it. These processes, along with handling, moving, storage and general housekeeping account for most of the dust emissions from the facility.

Coal from the surrounding mines is transported to the site by trucks. On-site, the coal is dumped into an underground hopper. Coal is crushed or screened as necessary.

The coal is then taken from the hopper via covered conveyor and placed into a stacking tube. The coal stacking tubes with windows are allowed to open for cone stacking. The stacking tubes reduce and minimize the dust from freefall. The coal from the open stockpiles is recovered via underground feeders and carried by covered conveyor to a totally enclosed 10,000 ton silo for unit train loading. Water spray systems are located on the underground reclaimed feeders.

Air Quality

Efforts have been made throughout the coal handling system to minimize the generation of dust. This has been done through the utilization of enclosures to prevent wind action upon materials on conveyors, in the loadout silos, in the stacking tubes, and in the truck dumps. Water sprays have also been added to reduce dust emissions at the breaker, beneath pile reclaim feeders, and the stacking tubes. The inherent moisture of the coal also aids in the reduction of the dust emissions.

Estimate of Uncontrolled Emissions

The potential exists for fugitive dust emissions resulting from vehicle traffic on the access and haul roads at Savage Coal Terminal. These roads are surfaced with asphalt, or crushed or pit-run gravel. Administrative controls will be applied to maintain strict speed control at the site, which will aid in reducing the fugitive dust potential. The gravel roads are treated with Magnesium Chloride and watered as necessary to help alleviate the dust produced by traffic. The frequency of application will be determined by visual observations of the degree of road dustiness.

Air Quality Control Plan

The Savage Coal Terminal is operated under an approved Air Quality Permit DAQE-ANI793003-06, issued by the State of Utah Department of Environmental Quality. Under this permit, the facility is approved to

- handle up to 10 million tons of coal per year.
- 724.500. Supplemental information. If the determination of the PHC required by R645-301-728 indicates that adverse impacts on or off the proposed permit area may occur to the hydrologic balance, or that acid-forming or toxic-forming material is present that may result in the contamination of ground-water or surface-water supplies, then information supplemental to that required under R645-301-724.100 and R645-301-724.200 will be provided to evaluate such probable hydrologic consequences and to plan remedial and reclamation activities. Such supplemental information may be based upon drilling, aquifer tests, hydrogeologic analysis of the water-bearing strata, flood flows, or analysis of other water quality or quantity characteristics.
- 724.600. N/A - This is a surface operation.
- 724.700. N/A - No operations are proposed in a valley holding a stream.
- 725. Baseline Cumulative Impact Area Information.**
- 725.100. This information has been previously compiled.
- 725.200. If this information is not available from such agencies, then the applicant may gather and submit this information to the Division as part of the permit application.
- 725.300. The permit will not be approved until the necessary hydrologic and geologic information is available to the Division.
726. N/A - Not required.

727. Alternative Water Source Information

Since there are no subsurface operations here, and since existing water rights are for irrigation and stock watering from established canals or creeks away from the operations, no adverse effect on water quantity should result from operation of this facility. In the event that a diminution of an existing water right should be shown to be a direct result of this operation, Savage Services Corporation will replace the proven lost portion of said right with water from its 357 shares of reservoir water. (See Appendix 7-2 for documentation of water rights.)

Water rights have been researched for the immediate and adjacent areas at Savage Coal Terminal, and are documented below:

*91 AREA T. 15 S.; R. 10 E.

<u>SECTION</u>	<u>SERIAL NUMBER</u>
10	None
11	2, 3, 78, 366, 764, 765, 3396, 3397, 4126
14	3294, 3295
15	3280, 3289, 3290, 3156

* Copies are on file at the State Engineer-Water Rights Office in Price, Utah.

728. Probable Hydrologic Consequences (PHC) Determination.

The probable hydrologic consequences determination is presented in Appendix 7-3.

728.100. See Appendix 7-3.

728.200. See Appendix 7-3.

728.300. See Appendix 7-3.

728.400. An application for a permit revision will be reviewed by the Division to determine whether a new or updated PHC determination will be required.

729. Cumulative Hydrologic Impact Assessment (CHIA).

729.100. Per Division.

729.200. An application for a permit revision will be reviewed by the Division to determine whether a new or updated CHIA will be required.

730. Operation Plan.

731. General

Water supply, drainage and sediment control are critical and essential factors to the successful operation of the Savage Coal Terminal. The main water supply for the operation is from the Price River, however, nearly all precipitation runoff is recirculated into the plant water system for beneficial use following sedimentation treatment. Shallow groundwater which occurred prior to site development is now intercepted and diverted around the area for the benefit to site stability.

Culinary water is supplied by Price River Water Improvement District through a buried waterline to the facility.

The primary source of water for the facility is from the Price River. A shallow, high-volume well is installed at the Price River north of the site and is pumped on demand via a 6-inch pipeline into a sump located at the northeast corner of the site (see Plate 5-2).

Savage Services Corporation has acquired rights to 357 shares of water from Scofield Reservoir. The usage at the facility is measured by a totalizing flowmeter which monitors incoming water from both the pipeline and sedimentation pond sources. Present usage averages 30-35 acre-feet per year.

Undisturbed Runoff Diversions

Runoff from approximately 7.16 acres of undisturbed area to the west of the operations area is intercepted by a diversion ditch and routed around the west and north edge of the facilities area. This undisturbed area includes subarea A shown on Figure 7-4. The diversion is designed to accommodate the peak discharge from a 10 year - 24 hour precipitation event. The diversion is designed, constructed and maintained to prevent additional contributions of suspended solids to

runoff outside the permit area.

Disturbed area runoff from the site is routed to the sediment ponds via collection ditches, as shown on Plate 7-2. Collection ditches vary in size and configuration; however, ditches will be maintained at minimum cross sectional areas as shown on Figure 7-13.

Sedimentation Control

Sedimentation Ponds and on-site drainage controls are shown on Plate 7-2. Sedimentation ponds are located to collect and treat runoff from various sub-drainages. All ponds are designed to store at least one year of sediment plus the runoff volume from a 10 year - 24 hour rainfall. The sedimentation ponds are arranged in series such that all runoff from disturbed areas passes through Sedimentation Pond No. 6. The outlet of Sedimentation Pond No. 6 is a UPDES discharge monitoring point.

Water from Pond 6 is normally not discharged, but is placed back into the preparation plant for re-use.

The sedimentation and other ponds will be cleaned periodically to maintain at least one year's sediment storage capacity. Cleaning is accomplished by a backhoe or dragline.

The drainage from the refuse pile is also collected in the sediment ponds with the other runoff water; therefore, the system is essentially a closed type, with no expected discharge, except in the event of a storm which exceeds the pond design limits.

Groundwater

Two groundwater drains have been installed at the Savage Coal Terminal site in the past and are located as shown in Plate 7-1. The drain on the eastern side of the property was installed to drain a boggy area, in order to facilitate construction of the present railroad grade.

Flow from the drain gradually diminished after installation and eventually it ceased. The other drain, which is located along the north and west property lines is 26 feet deep at the pump house and is installed at the surface of the Bluegate shale just below the weathered shale and soil. It flows continually throughout the year. The drain discharges into a sump and the water is used for coal preparation and dust control at the site. A flow from the drain of 22 gal/min was measured on August 20, 1980. Plant personnel report that the flow from the drain varies somewhat with the time of year.

Effects of Operations on Groundwater

In various places at or near the Savage Coal Terminal site, the water table approaches the surface and groundwater is lost to evaporation. The areas are distinguishable by heavy accumulations of salt on the soil surface and are generally soft and boggy. Two of these areas are found downslope from the Savage Coal Terminal site. One is found on the west side of the property immediately adjacent to the railroad tracks and several hundred yards south of the coal loading silo. The other is found in the farmland a half mile to the northeast of the site. Since shallow groundwater moves downslope toward the Price River, it eventually either seeps into the stream or is lost to evapotranspiration.

The principal effect of the Savage Coal Terminal operation on groundwater results from the operation of the French Drain. The drain intercepts shallow groundwater flows. This water is utilized by the facility as a source of water with excess water diverted to the Price River. Although the quality of the water is poor it is thought to be of superior quality to the water that would eventually seep into the Price River downslope of the site. Groundwater quality of water coming from the French Drain would be of superior quality to the water that would eventually seep into the Price River because it would not be subject to the degree of evaporation and concentration of salts that would occur upon natural seepage. Without direct measurements of seeps near the Price River, it is difficult to substantiate this statement.

However, a review of water quality data of the two wells downgradient from the French Drain show increasing concentration at CV4W is 11,400 mg/T while the mean concentration of TDS is the French Drain is 9,790 mg/l. These data suggest decrease in groundwater quality downgradient. These trends are thought to be due to extensive evaporation of groundwater seepage.

Refuse disposal is not anticipated to impact groundwater conditions. The refuse has been determined to be non-toxic and non-acid forming (see Chapter 5). The site is a natural groundwater discharge area. The French Drain has lowered the water table and reduced the rate of seepage and evaporation. As a result seepage or saturation of the refuse material is not expected to occur during operations. Leaching may occur but the rate will be extremely slow because of the high evaporation rates. Water extract analyses of the coal refuse reported in Chapter 5, Figure 5-2 indicate that leaching will not contaminate local groundwater.

Since the refuse pile is built up from ground level, there is little, if any, chance that saturation potential is also minimized by the fact that the refuse is located at the upper or higher elevation of the site, and the gradient of the groundwater flow is to the low (northeast corner) of the property. The French Drain will be rendered unusable during the reclamation period; at this time, groundwater elevations at the site can

be expected to rise to levels encountered prior to the drain installation.

The areas of refuse storage were not observed to contain high or surfacing groundwater prior to refuse disposal; therefore, it is not expected that these sites will be affected by groundwater saturation in the future.

The French Drain consists of a trench, originally dug to the unweathered shale, with a 12" perforated, galvanized culvert laid on the bottom. The trench was then filled with +2" drain rock for a depth of 4' or greater, covered with an impervious material and backfilled.

It has been in operation for nearly 30 years with no sign of plugging or failure. There is no reason to believe that the system will not continue to operate throughout the life of Savage Coal Terminal; however, should it fail at some point in time, it would be repaired. Such a failure could be detected by a sharp decrease or stoppage of the flow into the pump house. The impact of such a failure would likely not even become evident on the surface in the time it would take to restore the system, since the groundwater flow in the area is of such a small magnitude.

Since all major structures at the site are on pilings driven to bedrock, no major impacts would be expected with a failure of the drain system.

731.100. Hydrologic-Balance Protection.

731.110. Ground-Water Protection. In order to protect the hydrologic balance, coal mining and reclamation operations will be conducted according to the plan approved under R645-301-731 and the following:

731.111. Ground-water quality will be protected by handling earth materials and runoff in a manner that minimizes acidic, toxic or other harmful infiltration to ground-water systems and by managing excavations and other disturbances to prevent or control the discharge of pollutants into the ground water; and

- 731.112. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES ground-water quantity will be protected by handling earth materials and runoff in a manner that will restore approximate premining recharge capacity of the reclaimed area as a whole, excluding coal mine waste disposal areas and fills, so as to allow the movement of water to the ground-water system.
- 731.120. Surface-Water Protection. In order to protect the hydrologic balance, coal mining and reclamation operations will be conducted according to the plan approved under R645-301-731 and the following:
- 731.121. Surface-water quality will be protected by handling earth materials, ground-water discharges and runoff in a manner that minimizes the formation of acidic or toxic drainage; prevents, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow outside the permit area; and, otherwise prevent water pollution. If drainage control, restabilization and revegetation of disturbed areas, diversion of runoff, mulching or other reclamation and remedial practices are not adequate to meet the requirements of R645-301-731.100 through R645-301-731.522, R645-301-731.800 and R645-301-751, the operator will use and maintain the necessary water treatment facilities or water quality controls; and
- 731.122. Surface-water quantity and flow rates will be protected by handling earth materials and runoff in accordance with the steps outlined in the plan approved under R645-301-731.
- 731.200. There are presently 2 surface water monitoring points and 3 groundwater monitoring stations at the Savage Coal Terminal. All other ground water monitoring wells have been removed and sealed as of May 1999. The following is a list of existing water monitoring stations, along with sample frequency:

WATER MONITORING PROGRAM

Station	Location	Type	Frequency	Flow Device	Results To	Remarks
CV-1-W	Pumphouse	French Drain	Bi-annually	Time/Volume or Depth	DOGM	Sample during 2 nd and 4 th Quarters.
CV-14-W	N.E. Corner Property	Ditch	Bi-annually	Time/Volume	DOGM	Sample during 2 nd and 4 th Quarters.
CV-15-W	Sediment Pond Discharge	Pond Outlet	Monthly	Hand-Held Time/Volume	E.P.A., DOGM, Utah Health Dept.	Monitored per UPDES Permit
S-1-GW	South of French Drain	Ground Water Monitoring Well	Quarterly	Grab Sample Depth	DOGM	Quarterly - 2 years Bi-Annual - After
S-2-GW	South of Pond 5	Ground Water Monitoring Well	Quarterly	Grab Sample Depth	DOGM	Quarterly - 2 years Bi-Annual - After

Note: In addition to the above regular water monitoring schedule, baseline sampling will be completed on all stations at least once each 5 years. Baseline samples were taken in the 4th Quarter of 2009 and are scheduled to be taken again in the 4th Quarter of 2013. Baseline samples are analyzed per the parameter list on Table 7-17.

Water monitoring will include parameters on Table 7-17. Results will be submitted to the Division within 60 days following the end of each sampling cycle.

- 731.210. Ground-Water Monitoring. Ground-water monitoring will be conducted according to the plan approved under R645-301-731.200 and the following:
- 731.211. See 731.200 and Table 7-17.
- 731.212. Ground-water will be monitored and data will be submitted at least every six months for the French Drain and every quarter for the ground water monitoring wells S-1-GW and S-2-GW. Monitoring submittals will include analytical results from each sample taken during the approved reporting period. When the analysis of any ground-water sample indicates noncompliance with the permit conditions, then the operator will promptly notify the Division and immediately take the actions provided for in R645-300-145 and R645-301-731.
- 732.213. N/A - Not requested.
- 731.214. Groundwater monitoring will continue through operation; however, since the French Drain and monitoring wells will be removed during reclamation further monitoring of those sites will not be possible.

TABLE 7-17
SAVAGE COAL TERMINAL WATER MONITORING PARAMETERS

Field Measurements:	
Water Level or Flow:	
pH:	
Specific Conductivity:	
Temperature:	
Dissolved Oxygen: (Perennial streams only)	
Laboratory Measurements (mg/l): (Standard)	Additional Parameters for 5-Year Baseline
**Total Settleable Solids:	Alkalinity
Total Suspended Solids:	Ammonia
Total Dissolved Solids:	Lead (Dissolved)
Total Hardness (as CaCO ₃):	Boron (Dissolved and Total)
Acidity (CaCO ₃):	Selenium (Dissolved and Total)
*Carbonate (CO ₃ ⁻²):	Molybdenum (Dissolved)
*Bicarbonate (HC ₃ ⁻¹):	Nitrite
*Calcium (Ca):	Orthophosphate
Chloride (Cl ⁻):	Nitrate
Iron (Fe):	Arsenic (Dissolved)
*Magnesium (Mg):	Aluminum (Dissolved)
*Total Manganese (Mn):	Cadmium (Dissolved)
*Potassium (K):	Zinc (Dissolved)
*Sodium (Na):	
*Sulfate (SO ₄ ⁻²):	
***Oil and Grease:	
Cation - Anion Balance:	
* Dissolved Form ** UPDES Samples Only *** Designated Samples Only	

- 731.215. Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of ground water on-site and off-site will be properly installed, maintained and operated and will be removed by the operator when no longer needed.
- 731.220. Surface-Water Monitoring. Surface-water monitoring will be conducted according to the plan approved under R645-301-731.220 and the following:
- 731.221. See Section 731.200 and Table 7-17.
- 731.222. See Section 731.200 and Table 7-17.
- 731.223. See Section 731.200.
- 731.224. Surface water monitoring will proceed through operation and continue until bond release; however, only station CV14W will remain after removal of the sediment ponds. CV15W is a UPDES Discharge Point, and will be terminated upon removal of Sediment Pond No. 6.
- 731.225. Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of surface water on-site and off-site will be properly installed, maintained and operated and will be removed by the operator when no longer needed.
- 731.300. Acid- and Toxic-Forming Materials.
- 731.310. Drainage from acid- and toxic-forming materials and underground development waste into surface water and ground water will be avoided by:
- 731.311. The refuse pile has been tested and does not contain acid- or toxic-forming materials. The only other potentially acid- or toxic-forming material on site is in the form of oils, grease or fuels. These materials are stored within an enclosed concrete basin and trailer,

and the fueling area is bermed to prevent spillage from reaching any drainage.

731.312. See Section 731.311 above.

731.320. Storage, burial or treatment practices will be consistent with other material handling and disposal provisions of R645 Rules.

731.400. All previously installed water monitoring wells have been removed and sealed in a safe and environmentally sound manner approved by the Division. The only remaining wells are the French Drain containment, 2 new water monitoring wells and the river pump well. These structures will be removed upon reclamation and sealed in accordance with the reclamation plan in Section R645-301-540.

731.500. Discharges.

731.510. N/A - This is a surface operation.

731.520. N/A - This is a surface operation.

731.600. N/A - There are no areas of disturbance within 100 feet of a perennial or intermittent stream.

731.610. N/A.

731.620. N/A.

731.700. Cross Sections and Maps.

731.710. See Plate 7-1.

731.720. See Plates 7-1 and 7-2.

731.730. See Plate 7-1.

- 731.740. See Plate 7-2.
- 731.750. See Plates 7-3 through 7-5.
- 731.760. See Plates 7-3 through 7-5.

731.800. See Section 727.

732. Sediment Control Measures.

732.100. Siltation structures on site consist of rock gabions straw bales and silt fences. A typical section of each is shown in Figures 7-8, 7-9 and 7-10. These structures are maintained on a regular basis, and will be removed upon reclamation or when no longer needed.

732.200. There are a total of 5 sedimentation ponds on this site. See Plate 7-2 for location and Section 740 for design details.

732.210. All ponds on this site are temporary, and will be removed upon reclamation.

732.220. N/A - There are no coal processing waste dams, and no ponds meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a).

732.300. There are both undisturbed and disturbed diversions on this site. See Plate 7-2 for location, and Section 740 for design details.

732.400. See Section 742.400.

732.410. N/A - There are no plans to alter or relocate a natural drainageway.

732.420. N/A - There are no ditch relief culverts on this site.

733. Impoundments.

- 733.100 There are a total of 9 impoundments on this site. See Plate 7-2 for location, and Section 741 for design details.
- 733.110. All impoundment plans have been prepared and certified by a qualified, registered professional engineer in the State of Utah.
- 733.120. See Plates 7-3, 7-4, 7-5 and 7-6.
- 733.130. See Section 741.
- 733.140. N/A - No underground mining has occurred here.
- 733.150. See Section 741.
- 733.160. N/A - All impoundments are constructed and there are no plans for modifications.
- 733.200. All impoundments are temporary and will be removed upon final reclamation.
- 733.210. All impoundments are incised, which eliminates possibility of embankment failure. None of the impoundments meet the size or other qualifying criteria of MSHA 30 CFR 77.216(a).
- 733.220. N/A - All impoundments are temporary.
- 733.230. All impoundments are constructed and are temporary.
- 733.240. If any examination or inspection discloses that a potential hazard exists, the person who examined the impoundment will promptly inform the Division according to R645-301-515.200.
734. Discharge Structures, See Section 744.
735. Excess Spoil, See Section 745.

- 736. Coal Mine Waste, See Section 746.
- 737. Non-coal Mine Waste, See Section 747.
- 738. Temporary Casing & Sealing of Wells, See Section 748.
- 740. **Design Criteria and Plans.**
- 741. **Mine Plan Area Watersheds and Surface Runoff**

For the purposes of computing surface runoff and designing water diversion and sediment control structures, the watershed associated with the Savage Coal Terminal site was divided into seven subareas as shown on Figure 7-4. Subareas A, B and C are undisturbed areas and include upslope areas to the west of the site.

The remaining subareas comprise drainage units that are affected by operations and are subject to sediment control. Surface runoff from subareas A and B are diverted around the site by a diversion. The remaining subareas drain into sedimentation ponds on site.

The 10 year - 24 hour precipitation event for the area was determined from an isopluvial map prepared by the National Weather Service (NOAA, 1973) and was found to be 1.7 inches. The SCS curve number method (Soil Conservation Service, 1972) was used to determine runoff volumes.

Runoff Volumes

Each of the on-site subareas was further subdivided as shown on Figure 7-5 and Plate 7-2. Weighted curve numbers for the subareas were determined by the following procedure.

The percentage of each on-site sub-drainage that is occupied by the following categories was determined:

- a) Roads, buildings, pads and embankments.
- b) Topsoil, or soil, stockpiles.
- c) Coal Stockpiles.
- d) Compacted coal refuse piles.
- e) Other areas, including undisturbed area.
- f) Ponds.

The areas, except for ponds, were determined by making planimeter measurements on a 1:2400 scale base map. Pond areas were determined from Plates 7-3 through 7-5. Aerial photographs were used as an aid in interpreting the areal extent of each category. The percentage in each category was determined by dividing the area in a given category by the total area of the sub-drainage (excluding pond area).

An average curve number for each category was determined based on soil type, general condition, and hydrologic soil group. Hydrologic soil group was determined from the Soils map, Plate 2-1. In those areas where the soil type was mapped as disturbed land, hydrologic soil group "D" was assumed. The curve numbers determined are (corresponding with the above categories):

- a) 89
- b) 80
- c) 82
- d) 87
- e) 87

The ponds, of course, receive direct precipitation and therefore are considered separately from the other categories.

Table 7-18 presents the percentage of each category that was measured in each sub-drainage, and the weighted curve number for each sub-drainage.

Total runoff in each sub-drainage was determined by using the

weighted curve numbers, area of each sub-drainage, and SCS rainfall-runoff relationship:

Q = rainfall excess (inches)

$$Q = \frac{P - 0.2S)^2}{P + 0.8S}$$

Where:

$$S = \frac{1000}{CN} - 10$$

CN = Weighted curve number

P = 10 year - 24 hour precipitation value = 1.7 in. (NOAA, 1973)

Rainfall excess, Q, is generally determined graphically. In this instance, however, it was not practical to use the graphical method with the actual values, and therefore, the rainfall-runoff equation was used. Table 7-19 lists the runoff volume calculated for each sub-drainage.

TABLE 7-18
WEIGHTED CURVE NUMBER DETERMINATION

Drainage Area Number from Figure 7-5	Building Roads, Pads and Embankments CN=90 (%)	Topsoil or Soil Stockpiles CN=80 (%)	Coal Stockpiles CN=87 (%)	Compacted Coal Refuse Piles CN=87 (%)	Other Areas (excluding ponds) CN=87 (%)	Pond Areas (acres)	Total Acreage (acres)	Weighted CN for the Drainage
1a	15.0	-	12.1	-	73	0.61	14.96	87
1b	68.0	-	-	-	32.0	-	5.46	88
1c*	7.43	-	-	-	92.57	0.16**	36.65	87
5a	7.7	-	-	68.9	23.4	0.73	35.87	87
5b	9.2	-	52.3	-	38.5	-	14.31	85
5c	60.2	-	-	-	39.8	-	1.94	88
5d	14.2	-	-	-	85.5	-	17.03	87
5e	57.2	-	-	-	42.8	-	0.84	88
5f	-	10.0	-	-	-	-	4.38	80
6a	5.2	-	-	-	94.8	0.22	3.81	87
6b	66.7	-	26.7	-	6.6	-	5.46	87
6c	50.0	-	-	-	50.0	-	5.55	88

6d		10.0	-	-	-	-	90.0	-	2.45	87
6e		-	-	-	-	-	100.0	-	6.80	87
6f		10.0	-	-	-	-	100.0	-	5.44	87
A		-	-	-	-	-	100.0	-	7.16	87
* Includes subdrainage C ** Depression, no drainage but not a pond.										

TABLE 7-19
RUNOFF VOLUMES ESTIMATES

Area No.	Weighted Curve No.	Q in.	A acres	Total Runoff Acre-Feet
1a	87	0.68	14.96	0.848
1b	88	0.73	5.46	0.332
1c*	87	0.68	36.65	2.08
5a	87	0.68	35.87	2.030
5b	85	0.58	14.31	0.692
5c	88	0.73	1.94	0.118
5d	87	0.68	17.03	0.965
5e	88	0.73	0.84	0.051
5f	80	0.39	4.38	0.142
6a	87	0.68	3.81	0.216
6b	87	0.68	5.46	0.309
6c	88	0.73	5.55	0.338
6d	87	0.68	2.45	0.139
6e	87	0.68	6.80	0.385
6f	87	0.68	5.44	0.308
A	87	0.68	7.16	0.406

* Includes the offsite drainage designated C, because area C drains through Pond 1.

Note: Drainage areas are based on figure 7-5 and updated hydrology map and topography.

Determination of Peak Discharge from Off-Site Area A

The OSM Storm computer program was used to determine the peak discharges from the off-site area A, whose runoff is intercepted by the diversion shown on Figure 7-4 and Plate 7-2. Physical basin parameters were determined from topographic maps. The curve number of 87 was determined from the soil survey and vegetation characteristics. For the 10 year - 24 hour rainfall event, the highest peak discharge to be conveyed by the diversion was found to be 6.3 cfs.

Size of Diversion Channel

The diversion, shown on Figure 7-4, is intended to intercept and divert runoff from drainage A. It was excavated in the native soil, and is earth lined. Low velocities and regular maintenance serve to impede erosion. The channel is maintained with a minimum cross-sectional area of 4 ft². A typical diversion cross section is provided in Plate 7-3.

The length of the diversion is about 1,650 ft., and the elevation change along it is about 29 ft. The average slope of the channel is therefore about 0.0176.

Manning's formula was used to determine the adequacy of the channel. Manning's N, the roughness coefficient, was assumed to be 0.05.

The water depth, in the channel, is about 0.77 ft. for a discharge of 6.3 cfs. When depths of 0.5 ft. and 1.0 ft. were assumed, the discharge was found to be about 3.0 and 10.0, respectively. In all cases channel flow velocities are less than 3 ft. per second.

TABLE 7-20
DIVERSION DESIGN CALCULATIONS

OSM CHANNEL FLOW		OSM CHANNEL FLOW		OSM CHANNEL FLOW	
6.3	Q	0.	Q	0.	Q
1.	Z	1.	Z	1.	Z
0.	Y	0.5	Y	1.	Y
0.016	S	0.016	S	0.016	S
0.05	N	0.05	N	0.05	N
NORMAL FLOW		NORMAL FLOW		NORMAL FLOW	
2.49578998	V	1.988722023	V	2.848320997	V
2.524970153	A	1.5	A	3.5	A
6.3	Q	2.983083035	Q	9.969123489	Q
1.	Z	1.	Z	1.	Z
2.5	W	2.5	W	2.5	W
.7714323391	Y	0.5	Y	1.	Y
0.016	S	0.016	S	0.016	S
0.05	N	0.05	N	0.05	N

For:

Q = 6.3cfs

Y = 0.5 ft.

Y = 1.0 ft.

Where:

Q = discharge, cfs
 Z = side slope, H:V
 W = bottom width, ft
 Y = flow depth, ft
 S = bed slope, rise/run
 N = roughness coefficient

Sedimentation Pond Designs

The ponds are built below the level of the natural ground. Overflow of adequate capacity is provided at, or near, original ground level with a compacted berm approximately three feet high around the pond. The berm is for added protection from overflow only and does not serve as a dam. All ponds were constructed under the supervision of, and certified by, a registered, professional engineer.

Sedimentation Pond design specifications and details are provided in Plate 7-4, 7-5 & 7-6. The design capacities of each of the existing sedimentation ponds together with the required capacities for sediment storage and runoff volume are provided in Table 7-21.

Pond Number 1 refers to the series of ponds designated as 1, 2, and 3 on Plate 7-2. Pond Number 1 collects and treats runoff from sub-drainage areas 1 and C shown on Figure 7-4. Overflows from Pond Number 1 and Pond Number 5 flow to Pond Number 6.

The required runoff volume capacities reported in Table 7-21 were determined by adding the direct precipitation on the pond to the runoff volume from a 10 year - 24 hour rainfall for each of the sub-areas contributing to the pond. The direct precipitation to the ponds from a 10 year - 24 hour precipitation event is provided in Table 7-22. Runoff volume estimates for the various sub-areas are developed in Table 7-19.

The sediment capacity requirements were determined using the one year soil loss estimated by the USLE. Sediment capacity estimates are developed below:

Soil Loss and Sedimentation

The Universal Soil Loss Equation (USLE) was used to predict the rate of erosion for each on-site sub-drainage. The method, while having limitations, was useful because no better method was available. The USLE is,

$$A = (R)(K)(LS)(C)(P)$$

= erosion rate (ton/acre/year)

The variables, R, K, LS, C, and P, are defined in the following discussion.

R is the rainfall factor, which, simply stated, accounts for the erosive force of specific rainfall. R is either found on an isoerodent map, or calculated from

$R = 27P^{2.2}$, where P is the 2 year - 6 hour precipitation value (Barfield, Warner, and Haan, 1981). P, for Savage Coal Terminal, is 0.8 inch, and therefore, R is 16.5 (NOAA, 1973).

K is the soil erodibility factor. Appendix A of Preliminary Guidance for Estimating Erosion on Areas Disturbed by Surface Mining Activities in the Interior Western United States (EPA, 1977), lists K values for all established soil series in the western U. S. The K value for the native soils, except the Saltair series, is 0.43. K for the Saltair series is 0.55. Ka values are unknown for coal piles, coal refuse piles, roads, embankments, and other disturbed lands. A certain amount of judgment had to be exercised in selecting K values for the above types of areas. The K value for loose coal is likely relatively high, due to coal's low density and a large percentage of fines. A K of 0.60 was therefore assumed for the sub-drainages containing coal stockpiles.

The K value for intentionally compacted constructions, such as refuse piles, roads and embankments was assumed to be 0.50. The K value for relatively undisturbed native soils was assumed to be 0.43.

LS, the length slope factor, accounts for the length and steepness of the slopes on which erosion occurs. Length and slope estimates for the various sub-drainages are listed in Table 7-23. LS for the various areas was determined from these estimates using the procedure from the previously mentioned EPA reference (EPA, 1977).

The cover factor, C, accounts for the effects of various types of ground cover on erosion. For no ground cover a value of 1.0 is suggested. In this analysis, C was assumed to be 1.0 for most areas. For three relatively undisturbed areas, C was assumed to be 0.22 based on percentage and type of cover.

TABLE 7-21
SEDIMENTATION POND DESIGN CAPACITIES

Pond ¹ Number	Design Capacity (acre - feet)	Required ² Runoff Capacity (acre - feet)	Required ³ Sediment Capacity (acre - feet)
1	3.300	3.346	0.022
5	4.199	4.101	0.105
6*	2.150	1.726	0.025
Total	9.649	9.173	0.152

¹ Pond Number 1 includes ponds 1, 2 and 3 in Series.

² Required Runoff capacity includes runoff from a 10 year - 24 hour rainfall plus direct precipitation on the ponds.

³ Required Sediment Capacity is the estimated one year soil loss as determined from the USLE.

a.* Design Capacity is excluding filter dikes.

b. Flow through filter dikes is approximately 40 gpm, based on measurements.

c. Water entering pond No. 6 will be at a rate of approximately 40 gpm (pumping), except in the event of inflow from Ponds 1 or 5.

d. Porosity of filter dikes allows for passage of 40 gpm by actual measurement.

e. Design capacity is excluding static water level allowing for plant or thickener overflows.

TABLE 7-22 DIRECT PRECIPITATION TO SEDIMENT PONDS			
Pond No.	Pond Area (acres)	Volume (ft ³)	Volume (acre-feet)
1	0.61	3754	0.0864
5	0.73	4505	0.1034
6	0.22	1360	0.0312

* 10 year - 24 hour precipitation value is 1.7 inch (NOAA, 1973).

TABLE 2 EROSION RATE DETERMINATION										
Area No.	R	K	L(A)	S%	LS	C	P	A t/a/yr	Area (acres)	Erosion Rate (tons/yr)
1a	16.5	0.60	150	1	0.15	1.00	1.0	1.485	14.96	22.216
1b	16.5	0.50	250	2	0.27	1.00	1.0	2.228	5.46	12.165
1c	16.5	0.50	70	2	0.18	1.00	1.0	1.485	8.54	12.682
5a	16.5	0.50	800	2	0.38	1.00	1.0	3.135	35.87	112.453
5b	16.5	0.60	450	2	0.32	1.00	1.0	3.168	14.31	45.334
5c	16.5	0.50	70	4	0.35	1.00	1.0	2.888	1.94	5.603
5d	16.5	0.60	700	2	0.36	1.00	1.0	3.564	17.03	60.695
5e	16.5	0.50	150	1	0.15	1.00	1.0	1.238	0.84	1.040
5f	16.5	0.43	400	3	0.44	0.22	1.0	0.687	4.38	3.008
6a	16.5	0.50	200	2	0.25	1.00	1.0	2.063	3.81	7.860
6b	16.5	0.60	500	2	0.33	1.00	1.0	3.267	5.46	17.838
6c	16.5	0.50	100	2	0.20	1.00	1.0	1.650	5.55	9.158
6d	16.5	0.50	100	1	0.13	1.00	1.0	1.073	2.45	2.629
6e	16.5	0.50	300	2	0.28	1.00	1.0	2.310	6.80	15.708
6f	16.5	0.43	110	2	0.21	0.22	1.0	0.328	5.44	1.784

- 1) L was measured on topographic map.
- 2) C value of 0.22 was derived from Table 4, EPA-908/4-77-005, 1977.

Assumption was, no appreciable canopy, weeds, 25% ground cover.

	tons/yr	ac/ft/yr
1	47.063	0.022
5	228.133	0.105
6	54.977	0.025
Total	330.173	0.152

TABLE 7-24 TR-20 ANALYSIS OF POND OUTLETS FOR 25 YEAR - 24 HOUR RAINFALL EVENT					
Pond Number	Peak Inflow cfs	Discharge Outflow cfs	Outflow Water Depth ft	Slope %	Velocity ft/sec
1	7.03	6.82	0.89	1.0	3.25
2	6.82	6.78	0.88	1.0	3.24
3	6.78	6.73	0.87	1.0	3.23
5	11.31	9.71	1.28	0.5	2.75
6	20.29	19.93	1.16	1.0	4.16

P is the erosion control practice factor. When no erosion control measures are taken, P is assumed to be 1.0. In this analysis, P is assumed to be 1.0.

Erosion rates were estimated for each of the sub-drainages using the USLE factors and basin areas as shown in Table 7-23. The total weight of sediment eroded from each sub-drainage (in on year) was determined by adding the erosion rates for all of the sub-areas in each sub-drainage. A unit weight of 100 lbs/ft³ was assumed in order to determine the yearly volume of soil loss that may be delivered to the ponds (a sediment delivery ratio of 1.0 was assumed). The required sediment capacity provided in Table 7-21 represents the total annual soil loss from the sub-drainage contributing to the pond.

Outlet Designs

The design specifications for outlet structures are listed in Plates 7-3, 7-4 & 7-5. A stage-discharge relation was developed for the outlet channels using Manning's equation with the channel dimensions listed and a roughness coefficient of 0.03.

An inflow hydrograph to each was derived using the SCS runoff Curve Number procedures and the associated computer model TR-20. A weighted curve number was obtained for each sub-drainage using the procedures described in Table 7-18.

SAVAGE COAL TERMINAL SPILLWAY CALCULATIONS

<u>PARAMETER</u>	<u>POND NO. 5</u>	<u>POND NO. 6</u>
Q = Flow (cfs)	9.71	19.93
b = Bottom Width (ft.)	4.00	6.00
H = Depth of Flow (ft.)	0.85	1.05

Based on Broad-Crested Weir Formula $Q = 3.087 b H^{1.5}$

Sediment Cleanout Determination

Each pond will be equipped with a sediment marker for determination of sediment level. The sediment pond markers will be checked on a quarterly basis to determine sediment levels.

When the sediment accumulation reaches the cleanout depths as listed below (60% of maximum sediment storage) measures will be implemented to clean the affected pond within 60 days, weather permitting, of the measurement.

Cleanout levels for each of the ponds are as follows:

POND NUMBER	*SEDIMENT DEPTH (UP FROM BOTTOM)
1	1.20'
2	1.20'
3	0.96'
5	1.14'
6	0.72'

* Corresponding to the Bolt Location as shown on Figure 7-15.

The results of the TR-20 analysis for a 25 year - 24 hour rainfall and the Fletcher-Farmer Rainfall Distribution are provided in Table 7-24. The analyses was performed for the pond full when the event occurred.

Based on the analyses summarized above, the structures are more than adequate to accommodate the peak discharge from a 25 year - 24 hour rainfall. In the rare event that a discharge overtops a structure, little damage or erosion should occur because the ponds are incised.

Each of the sediment ponds is equipped with an overflow structure with erosion protection. The overflows between Pond number 1, 2, 3 and 6 consist of grouted rip-rap and concrete. The overflow from Pond 5 is protected with 8" drainrock leading into a channel with a gradient of approximately 1% flowing into Pond 6. Sediment Pond 6 has concrete and rip=rapped inlet structures, and the overflow or emergency spillway is protected by 8" drainrock channeled into an open channel discharge. Sediment pond details (including overflows) are shown on Plates 7-3, 7-4 & 7-5.

Site Drainage Control

The TR-20 storm hydrology analysis performed to assess sediment pond outlet adequacies was also structured to permit assessment of collection ditch and culvert capacities. Storm hydrographs from each sub-drainage are routed through the culverts and ditches shown on Plate 7-2. Design dimensions and design discharges and velocities for the collection ditches are provided on Plate 7-5. Design dimensions to the culverts designated on Plate 7-2 are provided in Table 7-25. All designed analyses were performed for a 25 year - 24 hour rainfall event using the Farmer-Fletcher rainfall distribution.

B.T.C.A. Areas

There are 7 small areas located within the permit area which do not drain into the sedimentation ponds. Six of these areas have been designated as "Best Technology Currently Available" or "B.T.C.A." Areas, and are shown on Plates 7-2 and 1-1 of this M.R.P. In addition, the buried pipeline area is designated a "Small Area Exemption" as shown on Plate 1-1 and detailed in Appendix 7-1. The following is a description of each area along with the treatment used for sediment control:

- (1) B.T.C.A. Area #1 - This is an area of approximately 0.69 acres located between the pump house access road and the railroad tracks. The area is blocked off by a berm and is mostly vegetated. The area drains to the north-east corner of the property where it joins the sediment pond #6 outlet ditch. A silt fence is maintained at the edge of the area for additional sediment control. The only runoff from this area is from direct rainfall, which is calculated to be 0.098 acre feet for a 10 year - 24 hour event (1.7 inches, NOAA, 1973). Treatment of runoff is by vegetative filter and silt fence. (Plate 7-2).

- (2) B.T.C.A. Ara #2 - This is a small area of approximately 0.28 acres located between the railroad loop and loadout tracks. The area has minimal vegetation, and is covered mostly by railroad ballast (slag). The top of the ballast is approximately 1.25 feet at the low end. Based on the slight slope, approximately $\frac{1}{2}$ of the area of 0.14 acres will contain runoff at an average depth of 0.625 feet, giving the area a potential storage volume of 0.088 acre feet. Since the only runoff to this area will be from direct precipitation, a 10 year - 24 or event would result in approximately 0.040 acre feet of runoff. The area is more than adequate to contain the expected runoff; therefore, the only treatment used for this area is total containment. (Plate 7-2).
- (3) B.T.C.A Area #3 - This is an area along the east edge of the property between the main railroad spur track and the silo loadout track. The area contains approximately 0.85 acres, and slopes to the north, where any runoff is contained between the two sets of tracks. The track (ballast) height is approximately 1.50' on the low end. Due to the slope, only $\frac{1}{4}$ of the area (0.22 acres) will contain runoff. This calculates to a potential storage volume of 0.165 acre feet for this area. Since the runoff from a 10 year - 24 hour event on this area is only 0.120 acre feet, the potential storage volume is more than adequate. Total containment is therefore the only treatment proposed for this area. (Plate 7-2).

- (4) B.T.C.A. Area #4 - This is an area of approximately 0.521 acres surrounding the pump house at the northeast corner of the site. A ditch on the west side intercept runoff and directs it into Pond #6. The area is in a slight depression, and is protected by berms to contain runoff. B.T.C.A for this area is total containment, since the only runoff here is from direct rainfall. The potential runoff from a 10 year - 24 hour event on this area is approximately 0.074 acre feet. The potential containment area is calculated to be a minimum of 0.26 acre feet, which is based on $\frac{1}{2}$ the area at a depth of 1 foot (due to the slight slope). The area is therefore more than adequate to contain expected runoff. (Plate 7-2).
- (5) B.T.C.A. Area #5 - This is an area of approximately 0.86 acres, consisting of the outslope of the railroad loop south of the refuse pile from culvert C-1 to the "Y" in the railroad. This area drains along the toe of the railroad and passes through a silt fence and a vegetated area for treatment prior to entering the 24" CMP beneath the main railroad spur track. The potential runoff from a 10 year - 24 hour event is approximately 0.12 acre feet. Treatment is by vegetation and a silt fence as mentioned above. (Plate 3-2).
- (6) B.T.C.A. Area #6 - This is the area surrounding the river pump located approximately 7,500' due north of the Northeast corner of the Savage Coal Terminal. The area is approximately 0.690 acres, and includes the well, pump, pump house and associated disturbance. The entire B.T.C.A. area is in a depression and does not drain. The treatment for this area is therefore, total containment. The potential containment area is calculated to be a minimum of 0.345 acre feet, which is based on $\frac{1}{2}$ the area at a depth of 1 foot (due to slight slopes). The potential runoff from a 10 year - 24 hour precipitation event is from direct rainfall, and is calculated to be 0.098 acre feet. The area is therefore more than adequate to contain the expected runoff. (Plate 1-1).

- (7) Small area Exemption #1 - This is the area consisting of the 20' Right-of-Way for the buried pipeline from the river pump to the northeast corner of the Savage Coal Terminal, as described in Chapter 1 and as shown on Plate 1-1 and detailed in Appendix 7-1. The entire area for exemption is approximately 20' wide by 10,000' long, or 4.59 acres. The exemption from siltation structures or alternate sediment control measures is based on R645-301-742.240, and the following:
- (a) The pipeline was installed in 1977-1978, and is totally buried;
 - (b) The line passes beneath farm roads and cultivated (and uncultivated) farm lands, which are graded and/or plowed at the discretion of the farmers;
 - (c) The area above the line is naturally revegetated or cultivated except where it passes beneath or along the roads; therefore, no surface evidence of the line exists;
 - (d) The area is small compared to the 160 acre permit area;
 - (e) It is not practical to install surface sediment controls in this area, which is used for farmland and livestock grazing.

Refuse Pile Drainage

The drainage from the refuse pile has been upgraded to accommodate a 100 year - 6 hour event (1.91 inches). As a result of the revised storm design requirements, 2 ditches and one culvert have been re-designed. Collection ditch CD-13 is on the north end of the pile parallel to the road, and drains the north and west slopes of the pile. Collection ditch CD-7 is along the south and east side of the pile, between the pile and the railroad. This is generally a broad, well vegetated area, and drains the south and east slopes of the pile. Drainage from the top of the pile is controlled by berms, which prevent drainage down the slope, and direct it to the low point of the pile where it flows into a 24" flexible culvert. This culvert is shown on Table 7-25 "Culvert Design Specifications."

The following pages will summarize the methodology used in the ditch and culvert design.

A typical cross section of the refuse pile drainage channels is shown on Figure 7-11. Design details are summarized for each of the channels in Table 7-26. The channel design is based on the following criteria:

- (1) 100 year - 6 hour precipitation event - 1.91 inches.
- (2) OSM Hydrology Program, using SCS-TR55 method for Type II storms.
- (3) Drainage areas taken from Plate 7-2.
- (4) Slopes taken from Plate 7-2.
- (5) Runoff curve number of 87 used as an average for the refuse area on Table 7-18 "Refuse Area".
- (6) Manning's No. of 0.035 used for roughness coefficient.

- (7) Critical velocity for erosion - 5 fps.
- (8) Runoff based on rainfall-runoff equation

$$Q = \frac{(P-0.2S)^2}{P+0.8S} = 0.83; \text{ where}$$

$$S = \frac{1000}{CN} - 10; \text{ CN} = 87; P = 1.91 \text{ in.}$$

TABLE 7-25
CULVERT DESIGN SPECIFICATIONS

Culvert Number	Discharge (cfs)	Diameter (ft)	Length (ft)	Normal Depth	Velocity (ft/sec)
C-1	0.81	1.0	30	0.45	2.38
C-1a	0.81	2.0	55	0.45	2.38
C-2	0.98	1.5	400	0.35	2.80
C-3	3.70	(2) 1.5	60	0.59	2.90
C-4	1.11	1.5	100	0.40	2.05
C-5	9.68	2.0	260	1.35	3.59
C-6	0.80	1.5	30	0.38	2.20
C-6A	0.80	2.0	300	0.38	2.20
C-7	10.56	2.0	40	1.43	4.40
C-8	0.77	1.5	60	0.38	2.20
C-9	1.44	1.5	50	0.51	2.70
C-10	11.97	2.0	40	1.60	4.44
C-12	5.11	1.5	40	1.11	3.64
C-13	5.11	1.5	130	1.17	4.73
C-13A	5.11	1.5	60	1.11	3.64
C-13B	5.11	1.50	100	1.11	3.64
C-15	20.50	2.0	30	2.87*	7.60*
C-17	0.80	1.5	160	0.46	2.20
C-18	0.80	1.5	100	0.46	2.20
C-19	0.22	1.0	50	0.28	1.19
C-20	0.22	1.0	50	0.28	1.19
C-21	1.11	2.0	200	0.34	2.05
C-22	13.88	2.0	175	2.10*	11.49
C-23	0.15	1.0	45	0.20	1.50
C-24	1.44	1.5	40	0.51	2.70
C-25	1.11	1.5	60	0.40	2.05
C-25A	1.11	1.5	50	0.40	2.05
C-26	1.44	1.5	50	0.51	2.70
C-27	1.44	1.5	50	0.51	2.70
C-28	1.44	1.5	50	0.51	2.70
C-29	0.48	1.5	40	0.44	3.11

*Head Water Depth = 3.50 ft.

***Erosion to be minimized by the use of 9" med. diam. rip-rap at the culvert outlet.

TABLE 7-26
REFUSE PILE DRAINAGE

Design Details			
Structure	CD-13	CD-7	C-22
Drainage Area (acres)	4.16	7.18	16.45
Precipitation: 100 year - 6 hour (inches)	1.91	1.91	1.91
Peak Discharge - Q100 (cfs)	5.20	8.98	13.88
Slope (%)	2.50	3.00	2.00
Bottom Width (feet)	0.00	2.00	24" cmp
Side Slope (H:V)	1:1	1:1	N/A
Manning's No.	0.035	0.035	0.024
Velocity (fps)	3.75	4.57	11.49
Runoff Curve No.	87	87	87
Rip-Rap Required (Y/N)	N*	N*	N*
Flow Depth (feet)	1.18	0.72	2.10
Time of Conc. (hours)	0.02	0.02	0.30

* Channels will be constructed within Mancos Shale or compacted refuse where erosive velocities are estimated at 6 fps or greater ("Applied Hydrology and Sedimentology for Disturbed Areas," Table 3-2, p. 162, Barfield, Warner & Haan, 1973). If erosion becomes evident, channels will be rip-rapped as necessary.

Jensen Property Berm

The constructed berm around the Jensen property provides for diversion of drainage from this area eastward along the railroad loop to the 24" culvert beneath the main line of the railroad at the southeast corner of the property. Cross-Section of the berm is shown on Figure 7-12, and location is shown on Plate 7-2.

The berm is more than adequate to divert the entire runoff from Area 5e shown on Figure 7-5 and described on Table 7-25, which shows an expected runoff of only 0.318 acre feet with a design peak flow of 0.81 cfs (Culvert C-1). Culvert C-1 will remain in place to divert drainage from the disturbed area remaining between the Jensen Property and the railroad loop.

742. Sediment Control Measures, See Section 741.

742.100. General Requirements.

742.110. Appropriate sediment control measures are designed, constructed and maintained using the best technology currently available to:

742.111. Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area; (See Section 741.)

742.112. Meet the effluent limitations under R645-301-751; and (See Section 741.)

742.113. Minimize erosion to the extent possible. (See Section 741.)

742.120. Sediment control measures include practices carried out within and adjacent to the disturbed area. See Section 741.

742.121. Sediment will be retained within the disturbed area. (See Section 741.).

742.122. See Section 741 and Plate 7-2 for details on undisturbed diversions.

- 742.123. See Section 741.
- 742.124. See Section 741.
- 742.125. N/A - There are no plans to treat runoff with chemicals.
- 742.126. N/A - This is a surface operation.
- 742.200. Siltation Structures.
- 742.210. See Section 741.
- 742.211. Additional contributions of suspended solids and sediment to streamflow or runoff outside the permit area will be prevented to the extent possible using the best technology currently available. (See Section 741).
- 742.212. All siltation structures have been constructed and certified.
- 742.213. N/A - Siltation structures are not designed to impound water.
- 742.214. N/A - This is a surface operation.
- 742.220. Sedimentation Ponds.
- There are 5 sedimentation ponds on this site. See Plate 7-2 for location and Section 741 for design details.
- 742.221. Sedimentation ponds, meet the following criteria:
- 742.221.1. Sedimentation ponds are used both in series and individually. (See Plate 7-2).
- 742.221.2. All ponds are located within the disturbed area and none are within a perennial stream.
- 742.221.3. All ponds are designed, constructed, and maintained to:

- 742.221.31. Provide adequate sediment storage volume - See Section 741.
- 742.221.32. Provide adequate detention time - See Section 741.
- 742.221.33. Contain the 10 year-24 hour precipitation event - See Section 741.
- 742.221.34. Provide a nonclogging dewatering device adequate to maintain the detention time required under R645-301-742.221.32 - See Section 741.
- 742.221.35. Minimize short circuiting - See Section 741.
- 742.221.36. Provide periodic sediment removal - See Section 741.
- 742.221.37. Ensure against excessive settlement - See Section 741.
- 742.221.38. Be free of extraneous or toxic materials - See Section 741.
- 742.221.39. Be compacted properly - See Section 741.
- 742.222. N/A - Sedimentation ponds do not meet the size or other qualifying criteria of MSHA 30 CFR 77.216(a).
- 742.223. All ponds are equipped with an adequately sized open-channel spillway.
 - 742.223.1. Spillways are lined with concrete or rip-rap.
 - 742.223.2. N/A
- 742.224. N/A - Ponds have open-channel spillways.
- 742.225. N/A - No exception requested.

742.230 Other Treatment Facilities

The only other treatment facilities on site are the B.T.C.A. areas and S.A.E. discussed in Section 741.

742.231 B.T.C.A. areas and S.A.E. are designed to treat or contain runoff from a 10 year - 24 hour precipitation event.

742.232 See Section 741.

742.240 N/A - No exemptions are requested with the exception of the B.T.C.A. areas and S.A.E. discussed in Section 741.

742.300 Diversions are discussed in detail in Section 741.

742.310 Undisturbed diversions are noted with a UD-n number. Disturbed area diversions or collection ditches are noted with a CD-n number. All diversions are shown on Plate 7-2.

742.311 N/A

742.312 Diversion designs are detailed in Section 741 and on Figure 7-13.

742.312.1 Diversions are designed to be stable. The majority of the existing diversions have been in place for over 25 years with no instability problems.

742.312.2 Diversions provide protection against flooding and resultant damage to life and property. See Section 741.

742.312.3 Diversions are designed to prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow outside the permit area. (See Section 741).

- 742.312.4 Diversions have been constructed with Division and O.S.M. approval, and comply with applicable local, Utah and federal laws and regulations.
- 742.313 All diversions are considered temporary, and will be removed and reclaimed during final site reclamation.
- 742.314 N/A
- 742.320 N/A - There are no perennial or intermittent streams at this site.
- 742.321 N/A
- 742.322 N/A
- 742.323 N/A
- 742.324 N/A
- 742.330 Diversion of Miscellaneous Flows
- 742.331 Diversion of miscellaneous flows on this site consist of the main undisturbed diversion UD-1 to divert undisturbed runoff around the disturbed area, and the French Drain to divert ground water. These diversions are discussed in detail in Sections 741 and 731.
- 742.332 See Plate 7-2 and Sections 731 and 741.
- 742.333 The undisturbed diversion is sized to carry runoff from a 10 year - 24 hour precipitation event.
- 742.400 Road Drainage
- 742.410 All roads on site are considered primary roads, and are constructed with appropriate drainage controls.

- 742.411 Portions of the main haul roads on site are now paved, with the remaining roads gravel surfaced and treated with magnesium chloride. All ditches and culverts have been designed and approved in accordance with Diversion criteria.
- 742.412 N/A - No roads are within the channel of an intermittent or perennial stream.
- 742.413 Runoff from all roads is collected in sediment ponds to prevent sedimentation and flooding.
- 742.420 All roads on site are considered primary roads.
- 742.421 All roads are located on stable surfaces, and all haul roads are paved or gravel-surfaced.
- 742.422 N/A - There are no stream fords at this site.
- 742.423 Drainage Control. Drainage control for all roads consists of a combination of adequately sized ditches and culverts, as shown on Plate 7-2.
- 742.423.1 Drainage controls for all roads are sized to carry the peak runoff from a 10 year - 24 hour precipitation event. (See Section 741).
- 742.423.2 Drainage pipes and culverts are constructed to avoid plugging or collapse and are equipped with erosion protection wherever needed.
- 742.423.3 See Section 741 for design details on drainage ditches.
- 742.423.4 N/A - No natural stream channels are altered or relocated at this site.
- 742.423.5 N/A - There are no stream channel crossings at this site.

743 Impoundments.

743.100 All impoundments at this site are considered temporary.

743.110 N/A - There are no impoundments meeting the criteria of MSHA, 30 CFR 77.216(a).

743.120 See Section 741 for impoundment design.

743.130 All impoundments are equipped with a single open-channel spillway.

743.131 Open-channel spillways are approved by the Division, and are constructed of grouted rip-rap, or are earth-lined and vegetated and carry infrequent flows at non-erosive velocities.

743.132 N/A.

743.140 Impoundments are inspected quarterly and certified on an annual basis in accordance with R645-301-514.300.

743.200 N/A - All impoundments are temporary.

743.300 All impoundments are equipped with spillways sized to carry runoff from a 25 year - 6 hour precipitation event. (See Section 741).

744 Discharge Structures.

744.100 Discharges from ponds, culverts or diversions are considered non-erosive at less than 5 feet per second. Whenever, calculations or site conditions indicate erosive velocities, outlets are protected by grouted rip-rap or rip-rap as described in Section 741.

744.200 See Section 741.

745 N/A - There is no excess spoil generated at this operation.

- 745.100 N/A - No excess spoil.
- 745.200 N/A - There are no valley or head of hollow fills.
- 745.300 N/A - No durable rock fills.
- 745.400 N/A - No pre-existing benches or excess spoil.
- 746.100 The only coal mine waste generated at this site is in the form of cleanout material from ditches and sediment ponds. Prep plant reject is hauled to the plant operator's approved site.
- 746.110 All coal waste is placed in the existing, approved refuse pile.
- 746.120 Coal waste is placed in the refuse pile and treated as refuse.
- 746.200 Savage Coal Terminal has an MSHA approved refuse pile which is still considered active. Design and operation details of the pile are described in Chapter 5.
- 746.210 The refuse pile is approved by both the Division and MSHA, and meets all applicable regulations as described in Chapter 5.
- 746.211 N/A - The refuse pile does not contain springs, water courses or seeps and is not constructed with underdrains.
- 746.212 The top of the refuse pile is surrounded by a berm to prevent uncontrolled runoff from the outslopes of the pile. The perimeter of the pile is also drained by diversion ditches sized to carry the runoff from the pile from a 100 year - 6 hour precipitation event, as required.
- 746.213 N/A - There are no underdrains.
- 746.220 The refuse pile is constructed by an approved plan which provides for stability through adequate compaction and drainage control.

- 746.221 The refuse pile is considered active and still under construction (and/or removal as discussed in Chapter 5); therefore, slopes and diversions have not been revegetated at this time.
- 746.222 N/A - No impoundments are planned on the refuse pile.
- 746.300 N/A - No impounding structures are constructed of coal mine waste.
- 746.400 N/A - There are no plans to return coal processing waste abandoned underground workings.
- 747 Non-coal mine waste is collected, stored and disposed of as described in Section 528.330.
- 747.100 See Section 528.330.
- 747.200 See Section 528.330.
- 747.300 See Section 528.330.
- 748 All decommissioned water monitoring wells have been plugged and sealed as approved by the Division. The 2 existing water monitoring wells, French Drain collection sump and river pump well are shallow, water systems. They will be reclaimed according to the approved plan as described in Section 540 of this permit.
- 750 All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.
- 751 Discharges or water from areas disturbed by coal processing and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for

- coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434. (See approved UPDES Permit).
- 752 Sediment control measures are located, maintained, constructed and will be reclaimed according to plans and designs given under R645-301-312.240, R645-301-732, R645-301-742 and R645-301-760.
- 753 See Section 741.
- 754 See Section 528.
- 755 See Section 748.
- 760 Reclamation is discussed in Section 540 of this M.R.P.
- 761 Reclamation will be performed as per Sections 540 and 550
- 762 All roads will be removed and reclaimed during final reclamation.
- 763 Siltation structures will remain in place as described in Section 540, until removal by the Division.
- 764 See Section 540 for reclamation timetable.
- 765 See Section 540 and 748 for details on sealing of wells.

References

- ¹ "Utah Climate", by Gaylene L. Ashcroft, Donald T. Jensen and Jeffrey L. Brown, Utah Climate Center, Utah State University, 1992.
- ² Utah Power & Light Company, 1974: Emery Generating Station Applicants Environmental Analysis - Volume II. Salt Lake City, p. 50.

Appendix 7-3

Probable Hydrologic Consequences Determination

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Appendix 7-3

Probable Hydrologic Consequences Determination

General

The original Probable Hydrologic Consequences Determination, or PHC, was developed for this site in 1983. At this time, the wash plant was operating full time and refuse was actively being deposited on site.

A series of groundwater monitoring wells were installed to monitor changes in water quality and levels. A sediment control plan was also developed to control surface runoff from the site. At that time, based on information provided in Chapter 7 of the MRP, it was determined that the proposed operation would not have an adverse impact on the hydrologic balance.

Since that time, a number of changes have taken place, including cessation of coal washing and refuse placement for nearly 25 years, removal of all ground water monitoring wells after acquiring 18 years of data and now a restart of the wash plant and installation of 2 new ground water monitoring wells.

The wash plant was restarted in 2009, and a series of 4 settling ponds were installed to remove -28 mesh material from the recycled wash water. The plant is operated by Arch Coal's Dugout Mine, and any refuse generated from the wash cycle is hauled off-site and placed in their approved disposal site. Therefore, the only material now being added to

Probable Hydrologic Consequences Determination

Savage Coal Terminal

the refuse area is from sediment pond and ditch cleaning on site. In fact, the refuse pile is being removed and used for power generation at the Sunnyside Cogeneration plant.

Procedure

The PHC Determination is based on information provided in Chapter 7, which includes baseline and operational hydrologic data acquired since 1983.

Groundwater Hydrology

Existing Groundwater Resources

The Savage Coal Terminal is near the middle of Castle Valley, a broad featureless plain between the Wasatch Plateau to the west and the San Rafael Swell to the east. The facility is located on the middle Bluegate shale member of the Mancos Formation and is approximately 500 feet above the Ferron sandstone member of the Mancos Formation. The Bluegate member consists of dark blue-gray marine mudstone and acts as an aquitard. The upper 10 to 20 feet consists of weathered clays, occasional lenses and pods of gravelly residuum, and residual type silty clay loam soils characteristic of the weathered Mancos shale.

Regional Groundwater Hydrology

A water table does exist in some locations above the impermeable Bluegate shale. In the general area, this water table exists in the alluvium or weathered shale and gravelly ponds above the Bluegate shale. The water is of poor quality and accumulations of salt are found where the water table approaches the ground surface. Groundwater is not used for irrigation in the area because of its poor quality. The nearest springs or wells to the Savage Coal Terminal site are located close to the town of Wellington on the opposite side of the Price River. Five wells and one spring exist in the alluvium above the Bluegate shale in this area. These wells and springs are in a different drainage and are not associated with the Savage Coal Terminal site.

Mine Plan Area Aquifers

Monitoring wells were completed in the weathered material above the Bluegate shale. In addition several wells were completed in the Bluegate shale in order to test the hypotheses that the low permeability of this unit isolates the water table aquifer from groundwater in the Ferron sandstone or deeper formations.

A total of 13 monitoring wells were completed on this site from 1980 - 1982. The wells were consistently monitored through 1998, when the wells were approved to be deactivated and removed.

In 2009, 2 new ground monitoring wells were installed as required by the Division. These wells were designated S-1-GW and S-2-GW, and were placed near the northeast corner of the site and below (east) of the refuse pile respectively. S-1-GW has not produced any useful data, and will be replaced in 2012 with a new well S-3-GW upon approval by the Division.

The measurements in the observation wells as recorded in Table 7-1 of Chapter 7 indicate that there is no regional ground water table at the site, although a perched water table exists at some locations on the site. The aerial extent of this perched water table could not be precisely determined from existing monitoring well network.

As previously mentioned, the original wells were monitored for 18 years at this site. When the wells were finally approved for removal, 5 of the 8 remaining wells had been dry for more than 5 years, 2 wells showed some ground water which appeared to be recharged by the irrigation canal south of the site. Water from one of these wells is also evident as ground water in Sediment Pond No. 5. The last remaining well was in an irrigated field east of the site, on land not controlled by Savage Services Corporation.

Of the 2 new wells installed in 2009, one has remained dry and will be replaced. The other has provided consistent data.

When the facilities were first constructed in 1977 - 1978, ground water was present throughout the site, ranging in depths from 0' to 20' from the surface. A French Drain system was placed along the western and northern edge of the property to intercept a majority of the ground water, which appears to be recharged primarily by the irrigation

Probable Hydrologic Consequences Determination

Savage Coal Terminal

canal systems located west of the property. This ground water is collected in a deep tank located at the northeastern corner of the property, and is regularly monitored as point CV-1W.

The French Drain has been in operation for approximately 28 years, and has been monitored on a regular basis. The inflow continues to range from 20 to 25 gpm. Water quality is poor - typical of ground water in this area - with TDS concentrations running approximately 10,000 mg/l.

Proposed Facilities

The only proposed change to the present system will be the replacement of the dry ground water monitoring well S-1-GW with a new well. The location of the new well will be determined by consultation with the Division.

Effects of Operations on Groundwater

This site has been in operation for over 31 years with no negative impacts to the ground water. During this time, the site has had coal washing and refuse generating activities, as well as a long period of operating as a coal storage and loadout facility.

The only potential for negative impact from the proposed facilities would be from possible acid/toxic contamination of the groundwater from the coal or refuse. This potential will be minimized by regular testing of the refuse for acid/toxic potential, as well as regular monitoring of the groundwater, and continued removal of the refuse pile.

Based on the past history of the site, and the present new operating and testing procedures, there should be no negative impact to the groundwater resources on this site.

Surface Water Hydrology

Regional Surface Water Hydrology

The regional area is drained by tributaries to the Green and Colorado Rivers; principal

tributaries are the Price and San Rafael Rivers and Muddy Creek. The flow is usually intermittent or perennial, in small streams in the mountains and in larger streams that originate in the higher mountains. Snowmelt is major contributor to streamflow and it provides the continuity of flow in the perennial streams as well as some seasonal flow to intermittent streams. Many streams are ephemeral and flow only in direct response to precipitation or snowmelt. Ephemeral flow is characteristic of the lowlands such as Castle Valley where the Savage Coal Terminal facility is located. Summer precipitation does not usually produce much runoff, although intense rainfall may cause high runoff in localized areas.

The site drains into the Price River which flows into the Green River. The water in the upper reaches of the Price River is of high quality; however, as the river traverses the central and lower portion of the Price River basin, the quality of the water in the river steadily degrades due to the geologic nature of the area and to the irrigation return flow which enters the river.

Mine Plan Area Watersheds and Surface Runoff

For the purposes of computing surface runoff and designing water diversion and sediment control structures, the watershed associated with the Savage Coal Terminal site was divided into five subareas as shown on Figure 7-4 in Chapter 7. Subareas A and C are undisturbed areas and include upslope areas to the west of the site. The remaining subareas comprise drainage units that are affected by operations and are subject to sediment control. Surface runoff from subarea A is diverted around the site by a diversion. The remaining subareas drain into sedimentation ponds on site.

Runoff from the disturbed areas on site is directed to a series of 5 sediment ponds by a combination of collection ditches and culverts. All surface hydrologic structures are sized to carry runoff from a 10 year-24 hour storm event, including the storage capacity of the sediment ponds. Sediment Ponds 1, 2 and 3 are in series and flow to Sediment Pond 6.

Sediment Pond 5 also flows to Sediment Pond 6. The water from Pond 6 is normally drawn into the pumphouse and pumped back to the wash plant for use in the wash cycle or as dust suppression water. In the event Pond 6 overflows, it is sampled according to the approved UPDES Discharge Permit.

Probable Hydrologic Consequences Determination

Savage Coal Terminal

The natural surface runoff in the area is of poor quality with total dissolved solids ranging from 2000 to 3000 mg/l. Surface runoff from most of the site occurs infrequently. Site discharges are even less frequent, with only 2 UPDES discharges within the last 5 years.

Present Facilities

The restart of the wash plant has had no noted effect of the surface water hydrology at the site. The wash plant recirculates water, as well as using make-up water from the existing supply system and recirculated runoff water from the sediment ponds. No refuse from the wash plant is stored on site. The new settling ponds are incised and surrounded by berms to prevent any inflow of surface runoff. The new disturbed area drains to the existing Sediment Pond 1, and the undisturbed area runoff continues to be diverted around the facilities by a reconstructed diversion ditch.

Effects of Mining on Surface Water

Protection of the hydrologic balance at Savage Coal Terminal is accomplished by control of runoff from disturbed areas, diversion of runoff from undisturbed areas, and diversion collection and recirculation of water supply and storm water. There are no subsurface operations at this site.

In general, most of the disturbed area runoff, poor quality groundwater, and all plant overflow water is cleaned and recirculated with no discharge from the property. The natural (undisturbed) drainage is allowed to flow into natural channels, bypassing the disturbed areas. Excess french drain water may be released to the Price River. Storm water runoff from disturbed areas may also be released to the Price River once effluent limits have been met.

This site has been in operation for more than 31 years, with no negative impacts to

Probable Hydrologic Consequences Determination

Savage Coal Terminal

surface water quality or quantity. The new washing scenario is very similar to the original system on this site, and therefore, also should not have any negative effects.

It should be noted that the existing water monitoring program will continue to be implemented to evaluate any potential impacts of the operation.

PHC Determination

In accordance with R645-301-728.100, the proposed operation will not have a negative impact on quality and quantity of surface and ground water under seasonal flow conditions for the proposed permit and adjacent areas.

This determination is based on baseline hydrologic, geologic and 29 years of historical operating and monitoring data for this site.

The following findings are included in this PHC determination:

- (1) There are no adverse impacts expected to occur to the hydrologic balance, based on historical data;
- (2) No acid-forming or toxic-forming materials are known or expected to be present, based on past and on-going sampling;
- (3) There are no expected impacts from the operation on sediment yield, quality parameters, flooding or streamflow alterations or water availability, as discussed in the previous text;
- (4) Based on available data, the ongoing operation will likely not proximately result in contamination, diminution or interruption of an underground or surface source of water within the permit or adjacent areas which is used for

domestic, agricultural, industrial or other legitimate purpose.

Appendix 8-1

Reclamation Cost Estimate

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Direct Costs

Subtotal Demolition and Removal	\$974,125.00
Subtotal Backfilling and Grading	\$493,173.00
Subtotal Revegetation	\$224,504.00
Direct Costs	\$1,691,802.00

Indirect Costs

Mob/Demob	\$169,180.00	10.0%
Contingency	\$84,590.00	5.0%
Engineering Redesign	\$42,295.00	2.5%
Main Office Expense	\$115,042.00	6.8%
Project Mainagement Fee	\$42,295.00	2.5%
Subtotal Indirect Costs	\$453,403.00	26.8%

Total Cost 2011 Dollars \$2,145,205.00

Number of years	5
Escalation Factor for 2011 (1.7 %)	1.0879
Escalation	\$188,564.00

Number of years	
Escalation Factor	
Escalation	
Escalated Reclamation Cost to 2016	\$2,333,769.00
Bond Amount (rounded to nearest \$1,000)	\$2,334,000.00
Posted Bond 2009	\$2,525,000.00
Difference Between Cost Estimate and Bond	\$191,000.00
Percent Difference	7.56%

Task ID # / CO 10051

Ref.	Description	Materials	Means Reference Number	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Shop Office 01																		21388
	Scale House 02																		1896
	No 1 Truck Dump 03																		5309
	No 2 Truck Dump 04																		2876
	No 3 Truck Dump 05																		1698
	No 4 Truck Dump 06																		2066
	No 5 Truck Dump 07																		1265
	Conveyor 8 Light 08																		10241
	Conveyor 48 Heavy 09																		10241
	No 1 Storage Shed 10																		4143
	No 2 Storage Shed 11																		1351
	Crusher Plant 12																		2350
	Support Structure 13																		1744
	Water Tank 14																		8554
	Reslain Tunnel 15																		38411
	Portable Hopper 16																		1977
	Trailer 17																		1410
	Transfer Bin 18																		2349
	Preparation Plant 19																		235184
	Substation 20																		6554
	Fuel Storage 21																		4852
	Reslain Control Bld 22																		1847
	Sample House 23																		4844
	Shedding Tube 24																		50301
	Loadout Silo 25																		248211
	Railroad 26																		17000
	Powerline 27																		3126
	Asphalt 28																		42105
	Paraphouse 29																		13870
	River Pump 30																		222
	Guard Rails 31																		74498
	Culverts 32																		2891
	Shedding Tube 33																		26880
	Coal Sampler Addition 34																		6040
	Conveyor Transfer 35																		18652
	New Shop Oil Storage Bld 36																		22541
	Plant Expansion 37																		6314
	Remove Road Gravel																		65307

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Shop Office 01																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CF		125	45	10								FT		58580 CF		17498
	Structure's Vol. Demolished																0.01	21 CY		
	Rubble's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON							17					CY				595
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost	Chain link remove 8'-10'	02 41 13 60 1700	3.88 /LF		240										LF				928
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	11.38 /CY		100	45	0.5								FT		83 CY		945
	Concrete's Vol. Demolished																1.3	108 CY		
	Loading Cost	Front end loader 3 CY	31 23 18 42 1900	1.79 /CY																189
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trip	31 23 23 20 1014	2.9 /CY																913
	Disposal Costs	Disposal on site	02 41 16 17 0200	8.15 /CF																968
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Scale House 02																		
	Structure Demolition Cost	Steel Bld. Lbrg	02 41 18 13 020	0.31 CF	12	12	8								FT		1187	CF	387
	Structure Vol. Demolished																0	CY	
	Rubber's Weight (exclude steel)																		
	Truck's Capacity																		
	Haulage																		
	Transportation Cost Non Steel Truck																		
	Transportation Cost Non Steel Drive																		
	Disposal Cost Non Steel	EGDC	EGDC	35 TON						0					CY		0	CY	
	Steel's Weight																		
	Truck's Capacity																		
	Haulage																		
	Transportation Cost Steel Truck																		
	Transportation Cost Steel Truck Drive																		
	Disposal Cost Steel																		
	Structure's Demolition Cost	Steel Bld. Lbrg	02 41 18 13 020	0.31 CF	75	15	3								FT		3375	CF	1046
	Structure's Vol. Demolished																1	CY	
	Rubber's Weight (exclude steel)																		
	Truck's Capacity																		
	Haulage																		
	Transportation Cost Non Steel Truck																		
	Transportation Cost Non Steel Drive																		
	Disposal Cost Non Steel	EGDC	EGDC	35 TON						1					CY		1	CY	35
	Steel's Weight																		
	Truck's Capacity																		
	Haulage																		
	Transportation Cost Steel Truck																		
	Transportation Cost Steel Truck Drive																		
	Disposal Cost Steel																		
	Equipment to Disposal Cost																		
	Demolition Cost																		
	Equipment to Vol. Demolished																		
	Loading Costs																		
	Transport Costs																		
	Disposal Costs																		
	Footer's Demolition	Concrete Demol	Concrete Demol	11.38 CY						15					CY		15	CY	171
	Demolition Cost																		
	Footer's Vol. Demolished																		
	Loading Cost																		
	Transportation Cost																		
	Disposal Costs																		
	Front and loader 3 CY																		
	12 CY (16 Ton) Dump Truck 12 mi. rtd. trip																		
	Disposal on site																		

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
	No. 1 Truck Dump 03																				
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31	CF	16	16	22								FT		5532	CF	1746	
	Structure's Vol. Demolished																	2	CY		
	Rubble's Weight (excludes steel)																0.01				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	ECDC	ECDC	35	TON						2					CY			2	CY	70
	No. 2 Truck Dump																				
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31	CF	16	6	6								FT		768	CF	238	
	Structure's Vol. Demolished																0.01		1	CF	
	Rubble's Weight (excludes steel)																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	ECDC	ECDC	35	TON						1					CY			1	CY	35
	No. 2 Truck Dump																				
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31	CF	200	30	1								FT		6000	CF	1880	
	Structure's Vol. Demolished																0.01		2	CY	
	Rubble's Weight (excludes steel)																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	ECDC	ECDC	35	TON						2					CY			2	CY	70
	Footen's Demolition																				
	Demolition Cost	Concrete Demol 1	Concrete Demol 1	11.38	CY																
	Footen's Vol. Demolished					30	40	1								FT		44	CY	501	
	Loading Cost	Front end loader 3 CY	31 23 18 42 1800	1.78	CY												1.3	57	CY	102	
	Transportation Cost	12 CY 116 Ton Dump Truck 12 mt. mt. bhp	31 23 18 42 1800	2.9	CY													57	CY	165	
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.15	CF													57	CY	522	

Ref.	Description	Materials	Measure Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	No 2 Truck Dump 04																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CF		16	16	22								FT	0.01	5632 CF		1746
	Structure's Vol. Demolished																	2 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDC	ECDC	36 /TON							2					CY			2 CY	70
	Steel's Weight																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Equipment's Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Footer's Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.38 /CY		120	8	1								FT			36 CY	410
	Footer's Vol. Demolished																	47 CY		
	Loading Cost	Front end loader 3 CY	31 23 16 12 1300	1.70 /CY													1.3		47 CY	84
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. trip	31 23 23 17 0300	2.9 /CY															47 CY	136
	Disposal Costs	Disposal on site	02 41 16 17 0200	9.15 /CF															47 CY	430
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	No. 3 Truck Dump 05																			
	Structure's Demolition Cost	Steel Bld. Large	62.41 16 13 0020	0.31 /CF	CF	14	14	20								FT	0.01	3920 CF	CF	1215
	Structure's Vol. Demolished																	1 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDC	ECDC	35 /TON	TON						1					CY		1 CY	CY	36
	Steel's Weight																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Footer's Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.38 /CY	CY	20	20	1								FT		16 CY	CY	171
	Footer's Vol. Demolished																	20 CY	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													20 CY	CY	36
	Transportation Cost	12 CY 116 Ton Dump Truck 1/2 mi. m.d. ltr	31 23 23 17 0320	2.8 /CY	CY													20 CY	CY	58
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF	CF													20 CY	CY	153
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	No. 4 Truck Dump 06																			
	Structure Demolition Cost	Shed Bld. Large	02 41 18 13 0020	0.31 /CF	CF	16	16	20								FT		5120 CF	1607	
	Structure Vol. Demolished																0.01	2 CY		
	Rubble's Weight (excluding steel)																			
	Truck Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						2					CY		2 CY	70	
	Sheets Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Footer's Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo 1	11.38 /CY	CY	48	4	2								FT		14 CY	159	
	Footer's Vol. Demolished																1.3	18 CY		
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													18 CY	32	
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. m.d. bto	31 23 23 17 0300	2.9 /CY	CY													18 CY	52	
	Disposal Costs	Disposal on site	02 41 18 17 0200	9.15 /CF	CF													18 CY	165	
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	No 5 Truck Dump 07																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CF	CF	30	14	8								FT	0.01	3380 CF	1042	
	Structure's Vol. Demolished																	1 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDO	ECDO	35 /TON	TON							1				CY		1 CY	35	
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Footer's Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demol	11.38 /CY	CY	10	15	1								FT		6 CY	68	
	Footer's Vol. Demolished																	13	8 CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.78 /CY	CY														14	
	Transportation Cost	12 CY 116 1-ton Dump Truck 1/2 mi. incl. tol.	31 23 23 17 0350	2.8 /CY	CY														23	
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.15 /CF	CF														73	
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Measures Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swal Factor	Quantity	Unit	Cost
	Conveyors Eight 08																			
	Structure's Demolition Cost	Steel Bul Large	02 41 18 13 0020	0.31 /CF	CF	1980	4	4										31680 CF		9821
	Structure's Vol. Demolished																	12 CY		
	Rubber's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Structure's Weight	EDDC	EDDC	35 /TON	TON						12								12 CY	420
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Structure's Weight																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
	Conveyor 48 inch 03																				
	Structures Demolition Cost	Steel Bld Large	02 41 18 13 0020	0.31 /CF	CF	1800	4	4								FT	0.01	31680 CF	9821		
	Structures Vol Demolished																	12 CY			
	Robber's Weight (exclude steel)																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	EODC	EODC	35 /TON	TON						12					CY			12 CY	420	
	Steel's Weight																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Truck Drive																				
	Disposal Cost Steel																				
	Equipment's Disposal Cost																				
	Demolition Cost																				
	Equipment's Vol Demolished																				
	Loading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Floor Demolition																				
	Demolition Cost	Concrete Demolition	Concrete Demo1	11.38 /CY	CY	10	15	1								FT		0 CY	0		
	Floor's Vol Demolished																1.3	0 CY	0		
	Loading Cost	Front end loader 3 CY	31 23 18 42 1300	1.79 /CY	CY													0 CY	0		
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. trip	31 23 23 17 0320	2.9 /CY	CY													0 CY	0		
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.15 /CF	CF													0 CY	0		
	Concrete Demolition																				
	Demolition Cost																				
	Concrete's Vol Demolished																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete's Vol Demolished																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Costs																				

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volumes	Weight	Density	Time	Number	Unit	Swail Factor	Quantity	Unit	Cost
	No. 4 Radial Shocker 10"																			
	Shocker's Vol. Demolished	Steel Bld. Large	02.41 18 0020	0.31 /CF	CF	200	8	8								FT	0.01	12800 CF	CF	3988
	Shocker's Vol. Demolished																	5 CY		
	Rubbish's Volume (Exclude Steel)																			
	Rubbish's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						5					CY			5 CY	175
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Floor Demolition																			
	Demolition Cost	Concrete Demolition	Concrete/Demo1	11.38 /CY	CY	10	15	1								FT	1.3	0 CY	0	0
	Floor's Vol. Demolished																	0 CY	0	0
	Loading Cost	Front end loader 3 CY	31 23 18 42 1900	1.79 /CY	CY													0 CY	0	0
	Transportation Cost	12 CY (18 Ton) Dump Truck 12 mt. mt. tip	31 23 23 17 0320	2.9 /CY	CY													0 CY	0	0
	Disposal Costs	Disposal on site	02.41 18 17 0200	9.15 /CF	CF													0 CY	0	0
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	No 5 Radial Stacker 11																			
	Structure's Demolition Cost	Steel Bld. Lame	02 41 18 13 0020	0.31	ICF	100	6	6								FT	0.01	3600 CF	1116	
	Structure's Vol. Demolished																			
	Structure's Weight (excludes steel)																			
	Truck's Capacity																			
	Truck's Demolition Cost Non Steel Truck																			
	Truck's Demolition Cost Non Steel Drive																			
	Truck's Demolition Cost Non Steel																			
	Truck's Weight	EGDC	EGDC	35	TON						1					GY		1 GY	35	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Equipment's Vol. Demolished																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Floor Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo1	11.38	ICY	0	0	0								FT		0 GY	0	
	Floor's Vol. Demolished																13	0 GY	0	
	Loading Cost	Front end loader 3 CY	31 23 18 42 1300	1.79	ICY													0 GY	0	
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. msl. ltr	31 23 23 1014	2.9	ICY													0 GY	0	
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.15	ICF													0 GY	0	
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Conveyor Piers 12																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 18 13 0020	0.31 /CF	0 CF	0	0	0	0							FT		0 CF		0
	Structure's Vol. Demolished																	0 CF		
	Structure's Weight (excludes steel)																			
	Truck Capacity																			
	Truck Capacity																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDC	ECDC	35 /TON	35 /TON						0					CY		0 CY		0
	Structure's Weight																			
	Truck Capacity																			
	Truck Capacity																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Floor Demolition	Concrete demolition	Concrete Demo 1	11.38 /CY	11.38 /CY	3	3	6								40 FT		80 CY		910
	Demolition Cost																	104 CY		
	Floor's Vol. Demolished																	104 CY		186
	Leading Cost	Front and loader 3 CY	31 23 16 42 1300	1.79 /CY	1.79 /CY															
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. ind. trip	31 23 23 17 0320	2.9 /CY	2.9 /CY															302
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.15 /CF	9.15 /CF															952
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Leading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Leading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Support Structure 13																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 18 13 0020	0.31 /CF		300	1	1							18 FT			0.01	5400 CF	1874
	Structure's Vol. Demolished																	2 CY		
	Rubble's Weight (excludes steel)																			
	Truck's Capacity																			
	Truck's Weight																			
	Truck's Capacity																			
	Truck's Weight																			
	Truck's Capacity																			
	Truck's Weight																			
	Truck's Capacity																			
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	Truck's Weight																			
	Truck's Capacity																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swal Factor	Quantity	Unit	Cost
	Water Tank 14																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 18 13 0020	0.31 /CF	CF						21990							21390 CF		6831
	Structure's Vol. Demolished																0.01	8 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						8								8 CY	280
	Rubble's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Floor Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.38 /CY	CY						90							1.3	90 CY	1024
	Floor's Vol. Demolished																	117 CY		
	Loading Cost	Front end loader 3 CY	31 23 18 42 1300	1.79 /CY	CY														117 CY	208
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rd. tps	31 23 23 17 0320	2.8 /CY	CY														117 CY	339
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.16 /CF	CF														117 CY	1071
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Items Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Reclaim Tunnel 15																			
	Structure's Demolition Cost	Steel Bld. Lrge	02 41 16 13 0020	0.31 /CF		1040	14	8										116480 CF		36108
	Structure's Vol. Demolished																0.01	43 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Sheet's Weight	ECDC	ECDC	35 /TON							43							43 CY		1666
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Diagonal Cost Steel																			
	Escape Tunnel																			
	Structure's Demolition Cost	Steel Bld. Lrge	02 41 16 13 0020	0.31 /CF				160	4									2011 CF		623
	Structure's Vol. Demolished																0.01	1 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Sheet's Weight	ECDC	ECDC	35 /TON							1							1 CY		35
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Diagonal Cost Steel																			
	Reclaim Tunnel 15																			
	Structure's Demolition Cost	Steel Bld. Lrge	02 41 16 13 0020	0.31 /CF		4	4	4							2			128 CF		40
	Structure's Vol. Demolished																0.01	0 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Sheet's Weight	ECDC	ECDC	35 /TON							0							0 CY		0
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Diagonal Cost Steel																			
	Escape Tunnel																			
	Structure's Demolition Cost	Steel Bld. Lrge	02 41 16 13 0020	0.31 /CF		6	6	6										612 CF		169
	Structure's Vol. Demolished																0.01	0 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Sheet's Weight	ECDC	ECDC	35 /TON							0							0 CY		0
	Truck's Capacity																			
	Hauling																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Diagonal Cost Steel																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Portable Hopper 16																			
	Structure Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CF	CF	20	12	14								FT	0.01	3380 CF	1 CY	1042
	Structure's Vol. Demolished																			
	Structure's Weight (excludes steel)																			
	Truck Capacity																			
	Truckage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						1					CY		1 CY	35	
	Sheet's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Pier's Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.38 /CY	CY	0	0	0								FT		0 CY	0	
	Pier's Vol. Demolished																1.3	0 CY	0	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													0 CY	0	
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. and up	31 23 23 17 0320	2.9 /CY	CY													0 CY	0	
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF	CF													0 CY	0	
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Trailer 17																			
	Structure Demolition Cost	Steel Bld. Lane	02.41.18.13.0020	0.31 /CF	CF	30	8	8								PT		1920 CF		595
	Structure's Vol. Demolished																0.01	1 CY		
	Rubber's Weight (exclude steel)																			
	Truck's Capacity																			
	Truck's																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDO	ECDO	35 /TON	TON						25					CY		25 CY		875
	Steel's Weight																			
	Truck's Capacity																			
	Truck's																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Transfer Bin 18																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 18 13 0020	0.31 /CY				30	18							FT	0.01	6032 GF	2 CY	1870
	Structure's Vol. Demolished																			
	Rubble's Weight (excludes steel)																			
	Trucks Capacity																			
	Truckage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Transportation Cost Non Steel																			
	Steel's Weight	ECDC	ECDC	36 /TON							2					CY			2 CY	70
	Trucks Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Pave's Demolition																			
	Demolition Cost	Concrete Demol	Concrete Demol	11.38 /CY		20	20	1								FT		16 CY		171
	Pave's Vol. Demolished																1.3	20 CY		
	Loading Cost		31 23 18 42 1300	1.79 /CY														20 CY		38
	Transportation Cost	Front end loader 3 CY	31 23 23 17 0320	2.9 /CY														20 CY		58
	Disposal Costs	12 CY (18 Ton) Dump Truck 1/2 mi. and trip	02 41 18 17 4200	9.16 /CY														20 CY		183
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Preparation Plant 19																			
	Structure's Demolition Cost	Steel Bld. Lrg	02 41 16 13 0020	0.31 /CY		110	80	80								FT		704000 CF		218240
	Structure's Vol. Demolished																0.01	261 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON							261					CY		261 CY		9135
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.38 /CY		110	80	1								FT		328 CY		3710
	Concrete's Vol. Demolished																1.3	424 CY		
	Loading Cost	Front and loader 3 CY	31 23 16 42 1300	1.79 /CY														424 CY		769
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. ind. trip	31 23 23 17 0320	2.9 /CY														424 CY		1230
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF														424 CY		3880
	Pave's Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.38 /CY							76					CY		76 CY		864
	Pave's Vol. Demolished																1.3	98 CY		
	Loading Cost	Front and loader 3 CY	31 23 16 42 1300	1.79 /CY														98 CY		175
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. ind. trip	31 23 23 17 0320	2.9 /CY														98 CY		284
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF														98 CY		897
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Substation 20																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CF		20	27	8								FT	0.01	4320 CF		1339
	Structure's Vol. Demolished																	2 CY		
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Pauline																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON							84					CY		84 CY		2240
	Steel's Weight																			
	Truck's Capacity																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Transformer's Disposal Cost	Mechanical equipment heavy	25 05 05 10 3620	1050 /ton												ton				2100
	Fence Cost	Chain link remove 8-10'	02 41 13 60 1700	3.86 /L.F		180						2				FT		180 FT		696
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo1	11.38 /CY		20	27	0.8								FT		10 CY		
	Concrete's Vol. Demolished																1.3	13 CY		
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY														13 CY		23
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. ind. trip	31 23 23 17 0320	2.9 /CY														13 CY		38
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.16 /CF														13 CY		119
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Fuel Storage 21																			
	Structure's Demolition Cost	3000 gal to 5000 gal tank	02 65 10 30 1023	780 EA											2	EA			2 EA	1560
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel										0								0 CY	0
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Trailer																			
	Structure's Demolition Cost	Mixed Materials Bld. Large	02 41 16 13 0100	0.33 /CF		10	50	8								FT			4000 CF	1320
	Structure's Vol. Demolished																	0.01	1 CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel										1								1 CY	35
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment to Disposal Cost																			
	Equipment to Cost																			
	Equipment to Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo 1	11.38 /CY		30	30	0.68							4	FT			91 CY	
	Concrete's Vol. Demolished																	1.3	118 CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY															118 CY	211
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. mtl. bld	31 23 22 17 0520	2.9 /CY															118 CY	342
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF															118 CY	1080
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo 1	11.38 /CY		30	30	0.5												
	Concrete's Vol. Demolished																		17 CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY															22 CY	38
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. mtl. bld	31 23 22 17 0520	2.9 /CY															22 CY	64
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF															22 CY	201

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swivel Factor	Quantity	Unit	Cost
	Reclaim Control Bld 22	Steel Bld Large	02 41 18 13 0020	0.31 /CF		22	16	12								FT	0.01	4224 CF 2 CY		1309
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Structure's Weight																			
	Structure's Capacity																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Pave's Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo1	11.38 /CY		22	22	0.5								FT		9 CY		102
	Pave's Vol. Demolished																1.3	12 CY		21
	Loading Cost	Front end loader 3 CY	31 23 18 42 1300	1.79 /CY														12 CY		35
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. m.d. tps	31 23 23 17 0320	2.9 /CY														12 CY		110
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.15 /CF														12 CY		
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete's Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Sample House 23																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 18 13 0020	0.31 /CF	CF	22	22	30								FT		14520 CF	CF	4501
	Structure's Vol. Demolished																0.01	5 CY		
	Rubber's Weight (exclude steel)																			
	Truck's Capacity																			
	House																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						5					CY			5 CY	175
	Steel's Weight																			
	Truck's Capacity																			
	House																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Equipment's Disposal Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Perfor Demolition	Concrete demolition	Concrete/Demo1	11.38 /CY	CY	22	22	0.5								FT		9 CY	CY	102
	Demolition Cost																1.3	12 CY	CY	21
	Perfor Vol. Demolished	Front end loader 3 CY	31 23 18 42 1300	1.79 /CY	CY															
	Loading Cost	12 CY (16 Ton) Dump Truck 1/2 mi. mtd. tps	31 23 23 17 0320	2.9 /CY	CY															
	Transportation Cost	Disposal on site	02 41 18 17 4200	9.15 /CF	CF															
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Stacking Tube 24																			
	Structure's Vol. Demolition Cost	Concrete Bld. Large	02 41 18 13 0050	0.44 /CF	CF			200	20							4 FT	0.01	62632 CF	27848	
	Structure's Vol. Demolished																	23 CY		
	Rubble's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Transportation Cost Non Steel	EGDC	EGDC	35 /TON	TON						23					CY			23 CY	806
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Equipment's Cost																			
	Equipment's Vol. Demolished																			
	Equipment's Cost																			
	Transport Costs																			
	Disposal Costs																			
	Pier's Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo1	11.38 /CY	CY					186						4 CY	1.3	744 CY	8467	
	Pier's Vol. Demolished																	967 CY	1731	
	Loading Cost	Front end loader 3 CY	31 23 18 42 1300	1.79 /CY	CY													967 CY	2804	
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tpe	31 23 23 17 0320	2.9 /CY	CY													967 CY	8848	
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.15 /CF	CF													967 CY	8848	
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Loadout Site 25																			
	Structure's Demolition Cost	Concrete Bld. Large	02 41 18 13 0080	0.44 /CF	ICF			200	50							4 FT		392699 CF		172788
	Structure's Vol. Demolished																			
	Rubber's Weight (exclude steel)																			
	Trucks Capacity																			
	House																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						145								145 CY	5075
	Steel's Weight																			
	House's Capacity																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Disposal Cost																			
	Equipment's Vol. Demolished																			
	Equipment's Vol. Demolished																			
	Landin Costs																			
	Transport Costs																			
	Disposal Costs																			
	Pad's Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo1	11.38 /CY	CY					2327						1 CY		2327 CY		28481
	Pad's Vol. Demolished																	3026 CY		6415
	Loading Cost	Front end loader 3 CY	31 23 18 42 1300	1.79 /CY	CY													3026 CY		8773
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. and the	31 23 23 17 0320	2.8 /CY	CY													3026 CY		27679
	Disposal Costs	Disposal on site	02 41 18 17 4200	9.15 /CF	CF													3026 CY		
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Mens Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Railroad 26																			
	Truck's Demolition Cost																			
	Concrete's Vol. Demolished																			
	Rubble's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
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	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
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	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
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	Truck's Capacity																			
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	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
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	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
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	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
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	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
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	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
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	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swal Factor	Quantity	Unit	Cost
	Powerline 27																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost	Powerpole	Emery Disp 01	125 EA											25 EA				26 EA	3125
	Equipment's Vol. Demolished	(Non Means 2011, Page 22)																		
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

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Ref.	Description	Materials	Meers Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost	
	Pumphouse 29																				
	Structure's Demolition Cost	Mixed Materials Bld. Large	02 41 18 13 0100	0.33 /CF	CF	40	28	10								FT		10400 CF	CF	3432	
	Structure's Vol. Demolished																				
	Rubber's Weight (exclude steel)																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						135								135 CY	CY	4725
	Steel's Weight																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Truck Drive																				
	Disposal Cost Steel																				
	Pumphouse																				
	Structure's Demolition Cost	Steel Bld. Large	02 41 18 13 0020	0.31 /CF	CF			8	12							1 FL		905 CF	CF	281	
	Structure's Vol. Demolished																	0.01	5 CY		
	Rubber's Weight (exclude steel)																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						5								5 CY	CY	175
	Steel's Weight																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Truck Drive																				
	Disposal Cost Steel																				
	Pumphouse																				
	Structure's Demolition Cost	Concrete Bld. Large	02 41 18 13 0050	0.44 /CF	CF			30	21							1 FL		10391 CF	CF	4572	
	Structure's Vol. Demolished																	0.01	4 CY		
	Rubber's Weight (exclude steel)																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Non Steel Truck																				
	Transportation Cost Non Steel Drive																				
	Disposal Cost Non Steel	EGDC	EGDC	35 /TON	TON						4								4 CY	CY	140
	Steel's Weight																				
	Truck's Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Truck Drive																				
	Disposal Cost Steel																				
	Equipment's Disposal Cost																				
	Equipment's Cost																				
	Equipment's Vol. Demolished																				
	Equipment's Weight																				
	Loading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Peds Demolition																				
	Demolition Cost	Concrete demolition	Concrete/Demo 1	11.35 /CY	CY	40	28	0.5								FT		19 CY	CY	218	
	Peds Vol. Demolished																	1.3	25 CY		
	Loading Cost	Front and loader 3 CY	31 23 18 42 1801	1.06 /CY	CY														25 CY	CY	27
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. mtd. tps	51 23 20 1014	2.9 /CY	CY														25 CY	CY	73
	Disposal Costs	Disposal on site	52 41 18 17 4200	9.15 /CF	CF														25 CY	CY	229

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	River Pump 30																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CY		8	8	8								FT		512 CF		159
	Structure's Vol. Demolished																			
	Rubber's Weight (exclude steel)																			
	Truck's Capacity																			
	Truck's Capacity																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Truck																			
	Steel's Weight																			
	Truck's Capacity																			
	Truck's Capacity																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Parts Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo 1	11.82 /CY		8	8	1								FT		2 CY		24
	Part's Vol. Demolished																			
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.06 /CY													13	3 CY		3
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. and up	31 23 23 20 1014	2.9 /CY														3 CY		9
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CY														3 CY		27
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Moore Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Guard Rail 31																			
	Structure's Vol. Demolished	Guard Rail removal	02.41 13.33 0900	15.06 LF	LF	4950										LF		4950 LF		74493
	Structure's Vol. Demolished																			
	Structure's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Sheets Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Soil Factor	Quantity	Unit	Cost
	Culverts 32"																			
	Excavate 12" diameter culvert	Excavation Bulk Bank 2 CY (3228L)	31 23 18 42 0280	1.76	CY	175	2	2								FT		28	CY	48
	Backfill 12" diameter culvert	Backfill Trench Mineral Haul 2 1/4 CY	31 23 18 13 3080	1.88	CY	175	2	2								FT		28	CY	51
	Excavate 18" diameter culvert	Excavation Bulk Bank 2 CY (3228L)	31 23 18 42 0280	1.76	CY	1850	2	3								FT		362	CY	637
	Backfill 18" diameter culvert	Backfill Trench Mineral Haul 2 1/4 CY	31 23 18 13 3080	1.88	CY	1850	2	3								FT		362	CY	717
	Excavate 24" diameter culvert	Excavation Bulk Bank 2 CY (3228L)	31 23 18 42 0280	1.76	CY	1300	2	4								FT		356	CY	678
	Backfill 24" diameter culvert	Backfill Trench Mineral Haul 2 1/4 CY	31 23 18 13 3080	1.88	CY	1300	2	4								FT		356	CY	762
		R 8 Means 2011)																		
		See Table 7-25 Culvert Design Specifications in Savage MRP																		
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Stacking Tube 33																			
	35' Conveyor																			
	Structure's Demolition Cost	Steel Bld. Large	02.41.16.13.0020	0.31 /CF	CF	100	45	10										45000 CF		13950
	Structure's Vol. Demolished	(1 stacking tube)																187 CY		
	Rubber's Weight (excl. steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDC	ECDC	35 /TON	TON													187 CY		5845
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Steel Stacking Tube																			
	Structure's Demolition Cost	Steel Bld. Large	02.41.16.13.0020	0.31 /CF	CF			80.3	10						2	FT		12613 CF		3910
	Structure's Vol. Demolished	(2 stacking tubes)																47 CY		
	Rubber's Weight (excl. steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDC	ECDC	35 /TON	TON													47 CY		1646
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	Concrete Demo1	11.38 /CY	CY						45							46 CY		523
	Concrete's Vol. Demolished																	80 CY		84
	Loading Cost	Front end loader 3 CY	31.23.16.42.1601	1.06 /CY	CY													80 CY		174
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. ind. trip	31.23.23.20.1014	2.9 /CY	CY													80 CY		548
	Disposal Costs	Disposal on site	02.41.16.17.4200	9.15 /CF	CF													60 CY		1131
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Coal Sander Addition 34																			
	Structure's Demolition Cost	Steel Bld. Large	02.41 16 13 0020	0.31 /CF	CF	27	26	16								FT		11232 CF	CF	3482
	Structure's Vol. Demolished																0.1	42 CF		
	Rubber's Weight (excludes steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Structure's Weight																			
	Structure's Capacity																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Demolition Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost	Concrete Demol.		11.38 /CY	CY	27	26	0.75								FT		19 CY	CY	216
	Concrete's Vol. Demolished																1.3	26 CY		
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													26 CY		46
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. max. trip	31 23 23 17 0350	2.9 /CY	CY													26 CY		73
	Disposal Costs	Disposal on site	02.41 16 17 0200	9.15 /CF	CF													26 CY		229
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Conveyor Transfer 35	Steel Bld. Large	02 41 15 13 0020	0.31 /CF		1538	7	4								FT		43084 CF		13350
	Structure's Vol. Demolished																	80 CY		
	Structure's Weight (exclude steel)																			
	Truck's Capacity																			
	Truck's Weight																			
	Truck's Capacity																			
	Truck's Weight																			
	Truck's Capacity																			
	Truck's Weight																			
	Truck's Capacity																			
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Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swall Factor	Quantity	Unit	Cost
	New Shop Oil Storage Bld 35																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0020	0.31 /CF		40	80	18								FT		57600 CF		17856
	Structure's Vol. Demolished																0.01	21 CY		
	Rubble's Vol. Demolished																			
	Truck's Capacity																			
	House																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	ECDC	ECDC	35 /TON									100			BxCF		28 ton		980
	Steel's Weight																			
	Truck's Capacity																			
	House																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Equipment's Disposal Cost																			
	Dismissing Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	Concrete/Demo1	11.38 /CY							128					CY		128 CY		1454
	Concrete's Vol. Demolished																1.3	184 CY		294
	Loading Cost	Front and loader 3 CY	31 23 16 42 1300	1.79 /CY														184 CY		476
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. and the	31 23 20 1014	2.9 /CY														184 CY		1501
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF														184 CY		1501
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost
	Plant Expansion 37																			
	Plant Feed Conveyor	Steel Bld. Large	02 41 16 13 0020	0.31 /CF	CF	233	4	4										3728	CF	1156
	Structure's Demolition Cost																0.01	1	CF	
	Structure's Vol. Demolished																			
	Plant Raw Coal Conveyor	Steel Bld. Large	02 41 16 13 0020	0.31 /CF	CF	200	4	4										3320	CF	992
	Structure's Demolition Cost																0.01	1	CF	
	Structure's Vol. Demolished																			
	Shed Conveyor	Steel Bld. Large	02 41 16 13 0020	0.31 /CF	CF	100	4	4										1600	CF	496
	Structure's Demolition Cost																0.01	1	CF	
	Structure's Vol. Demolished																			
	Shed Conveyor	Steel Bld. Large	02 41 16 13 0020	0.31 /CF	CF	100	4	4										1600	CF	496
	Structure's Demolition Cost																0.01	1	CF	
	Structure's Vol. Demolished																			
	Plant Feed Conveyor	Concrete demolition	Concrete/Demo1	11.38 /CY	CY						42.6							42.6	CY	485
	Demolition Cost																1.3	56	CY	
	Concrete's Vol. Demolished																			
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													56	CY	98
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tpe	31 23 23 20 1014	2.9 /CY	CY													56	CY	160
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF	CF													56	CY	503
	Plant Raw Coal Conveyor	Concrete demolition	Concrete/Demo1	11.38 /CY	CY						33.1							33.1	CY	377
	Demolition Cost																1.3	43	CY	
	Concrete's Vol. Demolished																			
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													43	CY	77
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tpe	31 23 23 20 1014	2.9 /CY	CY													43	CY	125
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF	CF													43	CY	383
	Relase Conveyor	Concrete demolition	Concrete/Demo1	11.38 /CY	CY						16.3							16.3	CY	174
	Demolition Cost																1.3	20	CY	
	Concrete's Vol. Demolished																			
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													20	CY	36
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tpe	31 23 23 20 1014	2.9 /CY	CY													20	CY	63
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF	CF													20	CY	183
	Shed Conveyor	Concrete demolition	Concrete/Demo1	11.38 /CY	CY						86.1							86.1	CY	968
	Demolition Cost																1.3	111	CY	
	Concrete's Vol. Demolished																			
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.79 /CY	CY													111	CY	199
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tpe	31 23 23 20 1014	2.9 /CY	CY													111	CY	322
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.15 /CF	CF													111	CY	1016

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